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**Seabird numbers and breeding success
in Britain and Ireland, 2005**

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Summary

Some findings of particular note in 2005 are summarised below:

Red-throated diver breeding success was close to, or above, average at the majority of sites monitored, although all nests on Coll failed due to bad weather.

Northern fulmar numbers were stable in most regions between 2004 and 2005, although there was a large increase in NE Scotland and a large decrease in NE Ireland. Productivity was similar to 2004, despite complete failure at two colonies, and thus below the long-term UK mean.

Surveys of both **gannetries** in the Channel Islands – Ortac and Les Etacs – found 2,547 and 4,862 AOS, respectively. Since 1999 numbers increased by 41% on Les Etacs but remained stable on Ortac. The UK and Ireland gannet population has increased by 13% to 262,066 AOS since 1994-95.

In response to a late winter/early spring wreck **great cormorant** and **European shag** numbers decreased in many eastern regions and, for shag, also in NW Scotland. Productivity of shags in Shetland and N and SE Scotland was particularly low, possibly due to birds failing to attain adequate breeding condition.

After 12 years of decline, the number of **Arctic skua** territories increased, although numbers remain low. There was a marked increase in Shetland, where the number of **great skua** territories also increased, but both species decreased in Orkney. Skuas were more productive than in 2004, despite a scarcity of sandeels.

Mediterranean gulls numbered at least 224 pairs. Breeding success was high, at 1.26 chicks fledged per pair.

Black-headed and **mew gulls** increased in most regions. Some large mixed colonies of **lesser black-backed** and **herring gull** have declined substantially in recent years. At most gull colonies breeding success was low to moderate in 2005. Once again, mink depressed the productivity of four gull species in NW and SW Scotland.

Breeding success of **black-legged kittiwake** was higher than in 2004, but still well below average for the UK and Ireland. Apparently low food availability early in the season resulted in late nest building at several colonies but conditions improved, allowing many birds to breed successfully. However, low success in NW Scotland and complete failure in N Scotland was attributed to low food availability there.

Sandwich tern numbers were stable between 2004 and 2005. Birds were generally successful, with the exception of those nesting in Scotland.

Overall **roseate tern** numbers were stable between 2004 and 2005. Notable increases were recorded on Coquet Island and at Lady's Island Lake. Productivity was high at the majority of colonies.

Common tern numbers increased slightly, with large increases in NE and SE Ireland, but a substantial decrease occurred in NE Scotland. Colonies adjacent to the Irish Sea were the most productive. Food availability problems probably depressed productivity in west and north Scotland and England, with predation also a factor at some English colonies. The number of **Arctic terns** in Shetland and Orkney recovered from the declines in 2004, with increases noted in most other regions. Breeding success was higher than in 2004, although only marginally so in the Northern Isles, probably due to low food availability. Colonies in NE England and Wales were very productive.

Little tern numbers increased substantially in SE Ireland, where the most successful colony was situated. Elsewhere, breeding success in England and Wales was low, due to localised food availability problems, tidal inundation and predation, but productivity in Scotland was higher than in the previous five years.

Common guillemot and **razorbill** numbers in sample plots increased (or at least remained stable) in northern and eastern regions and in Wales, with decreases in NW and SW Scotland. Whole-colony counts were broadly in line with these changes but, in addition, notable decreases occurred in NW England (razorbill only) and NE Ireland. For both species, breeding success was higher than in 2004 but still markedly below the long-term mean. Colonies in the north of Britain were generally less successful than others.

Black guillemot numbers in Shetland and Orkney were stable between 2004 and 2005. However, numbers have halved in Orkney since 1986, although there has been no net change in Shetland over this period.

1 Introduction

This is the seventeenth annual report on the results of seabird monitoring at colonies throughout Britain and Ireland, produced jointly by JNCC, RSPB and SOTEAG, as part of JNCC's Seabird Monitoring Programme. Available data on seabird breeding numbers and breeding success at seabird colonies in 2005 are summarised and compared with results from previous years, primarily 2004, with an analysis of longer term trends in the context of recent findings.

The information contained in this report has been collated from many sources. These include research staff and wardens from a variety of organisations including RSPB, SOTEAG, JNCC, Scottish Natural Heritage, English Nature, Countryside Council for Wales, Irish National Parks and Wildlife Service, the Wildlife Trusts, bird observatories, National Trust and National Trust for Scotland, the Centre for Ecology and Hydrology and BirdWatch Ireland. Many dedicated fieldwork volunteers also contribute valuable data to the Seabird Monitoring Programme; refer to the Acknowledgements section for details.

One aim of the annual report is to draw attention to notable changes in seabird numbers or breeding performance, which may merit direct conservation action or further research. It is also intended to provide feedback and, we hope, encouragement for future work, to the many individuals and organisations contributing data, by placing results for individual colonies or regions in a wider context. The results presented refer mainly to coastal or island populations of seabirds, but reference is also made to inland populations of great cormorants, gulls and terns where data are available.

Any comments on this report, or offers of help for future years, would be greatly appreciated by the authors. We are also keen to receive any existing additional information on numbers or breeding success for any seabird species, whether at coastal or inland colonies, which may not have been previously submitted to the Seabird Monitoring Programme. Any such data will be added to the long-term seabird databases maintained by JNCC and RSPB, including the JNCC/Seabird Group Seabird Colony Register.

Details of recommended methods for assessing seabird numbers and breeding success are given in the *Seabird monitoring handbook for Britain and Ireland* (Walsh *et al.* 1995). Copies of the *Handbook*, or other advice on seabird monitoring methodology, may be obtained from the Seabirds and Cetaceans Unit of JNCC at the address given on the title page.

1.1 The Seabird Monitoring Programme and Seabird Colony Register

The JNCC's Seabird Monitoring Programme facilitates the co-ordination of seabird monitoring on a UK-wide basis. The aim of the programme is to ensure that sufficient data on breeding numbers and breeding success of seabirds are collected both regionally and nationally to enable their conservation status to be assessed. The programme assists JNCC, RSPB and partner organisations, including the statutory country nature conservation agencies, to monitor aspects of the health of the wider marine environment and to provide sound advice relevant to the conservation needs of breeding seabirds.

Seabird monitoring directly funded by JNCC focuses particularly on species such as northern fulmar, European shag, black-legged kittiwake and auks, for which changes in breeding populations, breeding success or other parameters may provide evidence of changes in the marine environment as a whole. The most detailed monitoring is undertaken, through external JNCC contracts, at several geographically dispersed 'key sites': Isle of May (south-east Scotland), Fair Isle (Shetland), Canna (north-west Scotland) and Skomer (Wales).

Triennial monitoring of numbers and breeding success is also undertaken by JNCC on Orkney Mainland, on St. Kilda (north-west Scotland) and in Grampian (north-east Scotland); monitoring on St. Kilda in 2005 was undertaken by National Trust for Scotland, with assistance from JNCC. Monitoring of breeding success of cliff-breeding species is also encouraged by JNCC at many other colonies, partly by contributing to fieldwork costs of volunteers via the Seabird Group.

The RSPB monitors the numbers and breeding success of a range of seabird species throughout the UK through their network of reserves, and largely co-ordinates the monitoring of terns in Britain. Further RSPB monitoring or survey effort is directed at petrels and skuas.

In Shetland, Aberdeen University, under contract to SOTEAG, carries out extensive population monitoring of cliff-nesting species and black guillemots. This work is funded by the Sullom Voe Association Ltd. and forms part of a wider scheme of biological monitoring in Shetland. For northern fulmar, common guillemot and razorbill, annual counts are carried out in sample plots, and for European shag, black-legged kittiwake and black guillemot, counts are made of longer stretches of coastline at intervals of two or more years. Breeding success has also been assessed annually at many colonies since the mid-1980s.

Available data for Irish colonies are also collated by JNCC and RSPB, helping to place patterns or trends for British colonies in a wider context. Contacts are maintained with a number of bodies, including the National Parks and Wildlife Service and BirdWatch Ireland. Fieldwork at some Irish colonies is grant-aided by the Seabird Group.

The JNCC and Seabird Group also collaborate on the Seabird Colony Register, a database of colony counts for Britain and Ireland for the period 1969 to 1998, which is maintained as part of the Seabird Monitoring Programme. Many observers and organisations (including SOTEAG and RSPB) have contributed to the SCR and data have also been abstracted from sources such as research reports and county bird reports. Nearly all coastal colonies in Britain and Ireland were censused for the SCR in 1985-87, providing a baseline for seabird populations. A repeat complete census of British and Irish seabird colonies, Seabird 2000 (running from 1998-2002), was published as *Seabird Populations of Britain and Ireland* (Mitchell *et al.* 2004). Population changes since the 1985-87 census (and the Seabird Group's Operation Seafarer in 1969-70) are summarised in Table 1.1.1. A new seabird colony database for the period from 1999 is being developed within the National Biodiversity Network framework (a system for sharing information on wildlife being made available on the internet). Results of Seabird 2000 are available from JNCC's website: www.jncc.gov.uk/marine/seabirds/seabird2000/default.htm and data on individual sites can be accessed at www.searchnbn.org.uk.

1.2 Data presentation and methods

Some potential limitations of the information presented are outlined below. Further discussion of methodological considerations and details of analyses are given in Walsh *et al.* (1995) and in previous annual reports.

1.2.1 Population changes: use of regional samples

In order to allow concise and standardised presentation of population data, individual colonies are not comprehensively considered in detail in this report. Details of the original counts used in assessing population changes are held by JNCC, RSPB and SOTEAG.

For most species, with the exception of some terns, it is neither practicable nor valid to assess year-to-year changes for the breeding population as a whole, because such changes may vary markedly between different areas and monitoring effort is uneven. Instead, the coastline has been subdivided into 14 'regions', as defined in Figure 1.2.1 and Table 1.2.1. Within each region, valid counts of whole colonies (excluding very small colonies and colonies where counting error is known or suspected to

exceed 5%), or of sample plots within colonies, are summed for year-to-year population comparisons. The aim of this approach is to draw attention to any common patterns shown by a number of regions, as well as to highlight any notable changes shown by colonies in particular regions.

Regional population changes for most species are tabulated for 2003 and 2004. Some of the changes indicated by these counts may be of a short-term nature, not necessarily indicative of longer-term trends. For example, year-to-year changes in species such as black-legged kittiwake or European shag may in some instances reflect fluctuations in the proportion of the adult population attempting to breed. Movements of breeding birds to or from unmonitored colonies, notably in the case of terns, great cormorants, and black-headed gulls, may also contribute to apparent changes. Even where inter-colony movements do not occur, changes shown by sample populations are not necessarily representative of wider populations.

1.2.2 Calculation of population trends

Regional population trends are assessed using population indices, rather than sums of actual colony counts, because different combinations of colonies may be counted in different years. The population index in a baseline year (1986 unless otherwise noted), is set at 100, subsequent population changes being expressed relative to this value. Further details of the derivation of these population indices are given in Walsh *et al.* (1990) and in Thompson *et al.* (1997). Note that it has not been practicable to provide full listing in the tables of the sites used in the compilation of regional indices; please contact the authors for details.

Average annual rates of population change are calculated by linear regression of the logarithms of index values on year. The significance of the slope of the regression, equivalent to the average annual rate of increase or decrease in the population, is then assessed using the t-test (Mathsoft 1997). Population trends are not presented in this report for some mobile species, such as gulls, Arctic terns and common terns, for which the numbers of colonies and/or breeding pairs monitored each year are considered too small to enable wider population trends to be confidently assessed.

1.2.3 Accuracy and representativeness of counts

In comprehensive assessments of long-term changes in seabird numbers, there is inevitably some loss of count accuracy at the expense of obtaining complete geographical coverage. However, even stricter criteria, covering factors such as census unit, timing, frequency and apparent accuracy of counts, need to be applied when selecting counts for assessment of short-term changes, as in this report. For most species, single, well-timed counts of apparently occupied nests are sufficient. However, the possibility of undetected variations in count accuracy, count coverage or timing of breeding season should be borne in mind.

For northern fulmar, common guillemot and razorbill, numbers of adults attending colonies can fluctuate markedly from day to day. Given this variation, assessment of population change for these species ideally requires five to ten counts of adults (auks) or apparently occupied nest sites (fulmars) in June each year. The statistical significance of changes shown by such counts can be assessed using t-tests. Where such replication of counts is necessary, it is rarely possible to count the whole of a large colony. Therefore, counts are usually of sample plots within a colony, but these plots, even where randomly selected, will not necessarily be representative of the colony as a whole.

The seabird colonies regularly monitored may not be representative of British or Irish populations as a whole. Representativeness is more likely to be achieved within particular regions, but cannot be assumed, especially if few colonies or small population samples are monitored. In particular, if efforts are concentrated on individual colonies, the formation of new colonies elsewhere may go undetected. Coverage of extensive stretches of coastline is a more satisfactory approach for species not requiring replicate counts. This approach is used, for example, in SOTEAG's monitoring of European shags, black-legged kittiwakes and black gullmots in Shetland.

1.2.4 Breeding success: use of 'low-input' methods

For general monitoring purposes, the number of chicks fledged per breeding pair is the most useful parameter for gauging breeding success. Productivity of species other than terns is usually assessed for sample plots, ideally randomly selected, within colonies. For such species, the figures presented here have generally been averaged (rather than combined) across plots. For terns, whole-colony assessments of productivity are usually made. Full details of breeding success monitoring methods are given in Walsh *et al.* (1995). For some species or regions where few colonies are currently monitored, the results presented may not be fully representative. Also, in many cases, 'low-input' methods of assessing breeding success are used and these will tend to overestimate the productivity of breeding pairs slightly (Walsh *et al.* 1995). However, this is considered acceptable, as major geographical or year-to-year changes will still be obvious.

Table 1.1.1 Breeding seabird numbers in Britain and Ireland. Most figures are for 1998-2002 (Mitchell *et al.* 2004) but those for Northern gannet and roseate tern include more recent updates. All counts are of pairs unless otherwise stated. ¹ Not surveyed during Operation Seafarer and SCR. ² Northern gannet figures are from the complete UK and Ireland survey of colonies in 2003-2005 (Wanless *et al.* 2004, 2005a, b) with subsequent updates. ³ Inland colonies were not surveyed during Operation Seafarer or SCR. ⁴ Roseate tern figures are from this report. ⁵ Counts are of individuals. ⁶ Counts of pre-breeding adults were not carried out during Operation Seafarer and were not conducted in the Republic of Ireland during the SCR.

<i>Species</i>	Scotland	England	Wales	Isle of Man	Channel Islands	Northern Ireland	Republic of Ireland	Total population	% change since previous survey (coastal populations only)	
									Seafarer (1969-70)	SCR (1985-88)
Northern fulmar	485,852	6,291	3,474	3,147	317	5,992	32,918	537,991	+74	0
Manx shearwater ¹	126,545	367	168,133	34	10	4,633	32,545	332,267		
European storm-petrel ¹	21,370	1,475	2,805	0	60	0	99,065	124,775		
Leach's storm-petrel ¹	48,047	0	0	0	0	0	310	48,357		
Northern gannet ²	182,511	3,940	32,095	0	7,409	0	36,111	261,561	+90	+40
Great cormorant	3,626	2,896	1,699	134	134	663	4,548	13,681		
coastal component ³	3,626	1,315	1,634	134	115	663	4,073	11,560	+44	+7
European shag	21,487	3,863	914	912	1,403	301	3,426	32,306	-5	-25
Arctic skua	2,136	0	0	0	0	0	0	2,136	+106	-37
Great skua	9,634	0	0	0	0	0	1	9,635	+213	+26
Mediterranean gull	0	108	0	0	0	2	3	113		
Black-headed gull	43,191	82,728	1,986	2	0	10,107	3,876	141,890		
coastal component ³	6,888	65,549	850	2	0	4,037	2,066	79,392	+6	+2
Mew gull	48,113	44	0	6	0	557	1,060	49,780		
coastal component ³	20,467	33	0	6	0	383	586	21,475	+65	+39
Lesser black-backed gull	25,057	64,208	20,722	114	1,734	1,973	2,876	116,684		
coastal component ³	21,565	44,133	20,682	114	1,734	1,033	2,062	91,323	+83	+42
Herring gull	72,130	45,365	13,974	7,126	4,347	714	5,521	149,177		
coastal component ³	71,659	43,932	13,930	7,126	4,347	707	5,413	147,114	-57	-17
Great black-backed gull	14,776	1,476	427	405	310	76	2,243	19,713		
coastal component ³	14,773	1,466	425	405	310	71	2,241	19,691	-12	-6
Black-legged kittiwake	282,213	76,281	7,293	1,045	3	13,060	36,100	415,995	-7	-23
Sandwich tern	1,068	9,018	450	0	0	1,954	1,762	14,252	+18	-11
Roseate tern ⁴	4	92	0	0	0	7	733	836	-65	+52
Common tern	4,784	4,676	674	0	174	1,704	2,485	14,497	-3	-2
Arctic tern	47,306	3,602	1,705	8	0	767	2,735	56,123	+7	-29
Little tern	331	1,521	75	20	0	0	206	2,153	+12	-25
Common guillemot ⁵	1,167,841	91,986	57,961	4,566	476	98,546	138,108	1,559,484	+139	+32
Razorbill ⁵	139,186	11,144	12,638	1,524	65	24,084	27,446	216,087	+29	+23
Black guillemot ⁶	37,505	7	28	602	0	1,174	3,367	42,683		
Atlantic puffin	493,042	75,734	10,328	85	311	1,610	19,641	600,751	+33	+19

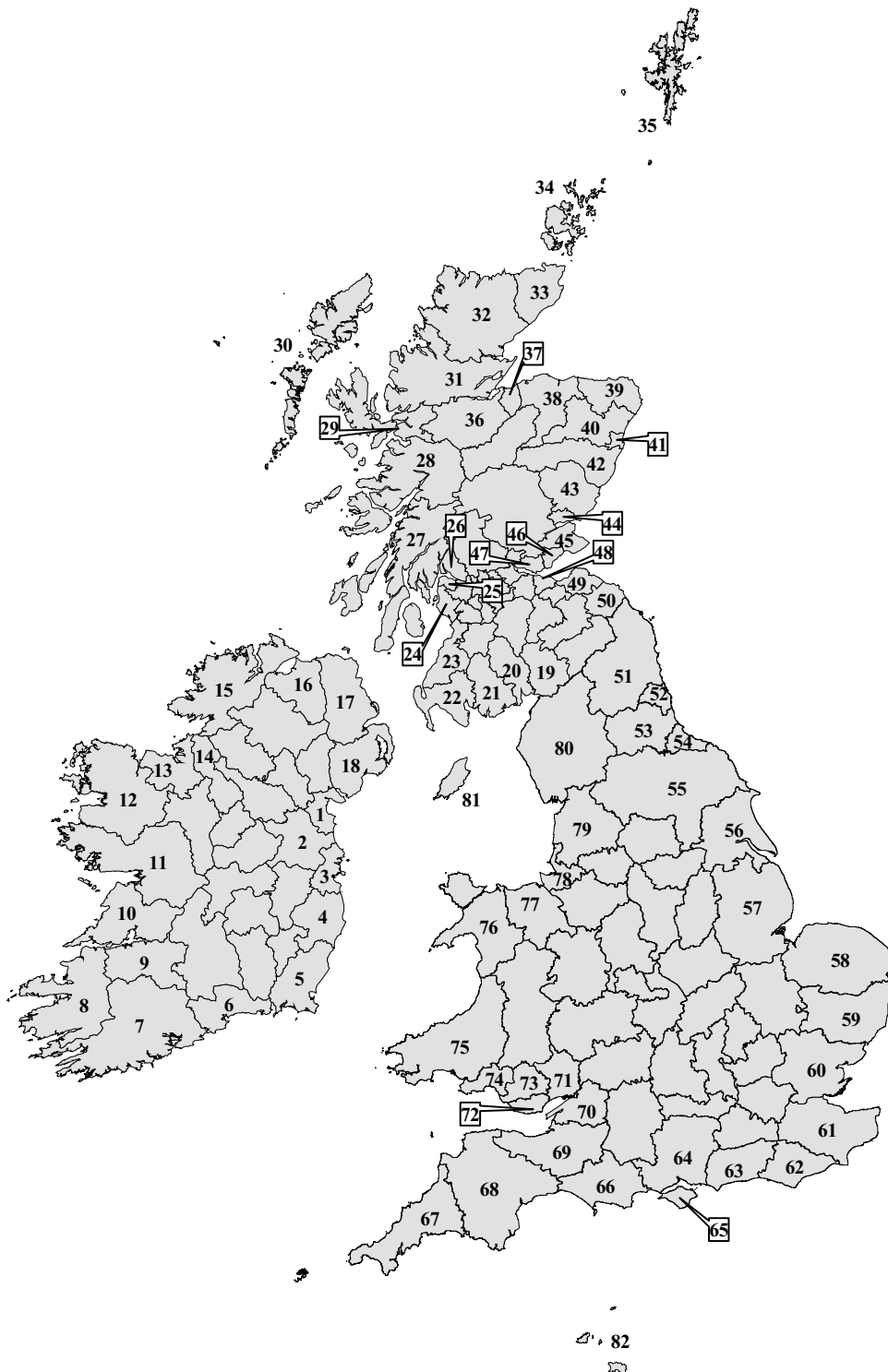


Figure 1.2.1 Coastal counties and districts of Britain and Ireland. See Table 1.2.1 for details of the coastal regions (combinations of counties or districts) used in this report.

Table 1.2.1 Groupings of coastal counties and districts used in assessing regional population changes. These regions are based on Figure 2 of Lloyd *et al.* (1991), except that Shetland and Orkney are each treated separately from 'NE Scotland' and the Inverness to Caithness coastline is treated separately ('N Scotland') from 'NW Scotland'.

County or district name (numbers refer to Figure 1.2.1)	Region
Louth (1), Meath (2), Dublin (3), Wicklow (4), Wexford (5), Waterford (6)	SE Ireland
Cork (7), Kerry (8), Limerick (9), Clare (10)	SW Ireland
Galway (11), Mayo (12), Sligo (13), Leitrim (14), Donegal (15)	NW Ireland
Londonderry (16), Antrim (17), Down (18)	NE Ireland
Annandale and Eskdale (19), Nithsdale (20), Stewartry (21), Wigtown (22), Kyle and Carrick (23), Cunninghame (24), Inverclyde (25), Dunbarton (26), Argyll and Bute (27)	SW Scotland
Lochaber (28), Skye and Lochalsh (29), Western Isles (30), west coast of Ross and Cromarty (31), north-west coast of Sutherland (32)	NW Scotland
Orkney (34)	Orkney
Shetland (35)	Shetland
Caithness (33), east coast of Sutherland (32), east coast of Ross and Cromarty (31), Inverness (36)	N Scotland
Nairn (37), Moray (38), Banff and Buchan (39), Gordon (40), City of Aberdeen (41), Kincardine and Deeside (42)	NE Scotland
Angus (43), City of Dundee (44), north-east Fife (45), Kirkcaldy (46), Dunfermline (47), West Lothian, City of Edinburgh (48), East Lothian (49), Berwickshire (50)	SE Scotland
Northumberland (51), Tyne and Wear (52), Durham (53), Cleveland (54), North Yorkshire (55), Humberside (56), Lincolnshire (57)	NE England
Norfolk (58), Suffolk (59), Essex (60)	E England
Kent (61), East Sussex (62), West Sussex (63), Hampshire (64), Isle of Wight (65)	SE England
Dorset (66), Cornwall and Isles of Scilly (67), Devon (68), Somerset (69), Avon (70), Channel Islands (82)	SW England and Channel Islands
Gwent (71), South Glamorgan (72), Mid Glamorgan (73), West Glamorgan (74), Dyfed (75), Gwynedd (76), Clwyd (77)	Wales
Merseyside (78), Lancashire (79), Cumbria (80), Isle of Man (81)	NW England and Isle of Man

2 General features of the 2005 breeding season

The first significant weather effect on seabirds in 2005 were gales and low temperatures in late winter in the North Sea, which, combined with a possible scarcity of food, resulted in an extended period of poor feeding conditions, most notably for European shags. The National Beached Bird Survey (Schmitt 2005) collected increased numbers of dead shags (and, to a lesser degree, cormorants and auks), mainly along coasts of eastern Britain, which were due to this 'wreck'. In addition, it is thought that many of the survivors were in poor condition and therefore did not breed. Consequently, the number of European shags that nested in 2005 was generally much lower than in 2004, especially in the north and east coast of Britain, where decreases of between 6 and 54% occurred.

April was changeable and wet in the UK as a whole, but often fine in Scotland in the latter half of the month. A brief cold spell occurred on 7-8 April, when Shetland recorded its coldest maximum April temperature for 20 years (0.1 °C). A depression brought rain and gales to many parts near the end of the month. May was, on average, the coolest since 1996 and dry in the south of the UK, though wetter than average in the north. There was a brief cold period mid month, with late frosts. Temperatures of 30°C were recorded in SE England toward the end of May, but it was far cooler in Scotland. The first half of June was cool, but thereafter was largely warm or hot and on average it was the warmest June since 1976. It was a wet month for much of Scotland but dry in SE Britain. July started with a period of cool and unsettled weather, with coastal gales and heavy rain. There followed a spell of hot weather, but the last ten days were very unsettled and cool (Eden 2005a-d).

The 2005 breeding season started generally later than average for many species in the Northern Isles and in places on the east coast of Britain. It appeared that food availability in these regions was low at the start of the season, resulting in delayed breeding, but increased later, in May and June, which apparently facilitated nest building and laying. Red-throated diver chicks from Hermanness, Shetland were thought to be about 10-20 days later than those from other sites on Unst, possibly due to later laying, poor food availability, or both (Okill 2005a; Thomas 2005). Arctic tern, black-legged kittiwake, guillemot, razorbill and Atlantic puffin all delayed breeding in many Shetland colonies and also on the Isle of May in south-east Scotland. Timing of breeding on the Isle of May was, overall, the latest ever recorded: the first kittiwake egg was not seen until 30 May; the first shag egg was laid on 6 May (*cf.* 17 April in 2004 and 1986-2003 mean of 10 April); the first guillemot egg was laid on 4 May (the latest date yet recorded at the site) and the median laying date was 17 May. Razorbills and puffins were also late on the Isle of May, the latter species breeding five days later than in any year since monitoring began on the island (Harris *et al.* 2005). Exceptions to this late tendency were seen in European shag at some- but not all - colonies in NW Scotland, which laid earlier than average (though shags in Shetland and south-east Scotland laid very late). Timing of breeding in south-western Britain appeared to be generally about average, though puffins bred earlier than usual on Skomer Island.

In general the 2005 seabird breeding season was slightly more successful than that of 2004, when widespread breeding failures occurred in the Northern Isles and in places down the east coast of Britain (Mavor *et al.* 2005). The failures in 2004 were thought to have been caused largely by low availability of sandeels; this was again the case in 2005, with sandeels being less prevalent than usual in the diets of many species or, if still prevalent, of the less-preferred size-class. Indeed, sandeels were so scarce in the North Sea that the European Commission closed the sandeel fishery in July 2005. However, in some colonies in 2005 alternative fish prey, such as gadoids, appeared to provide sufficient nutrition to enable at least some chicks to fledge. In contrast to 2004 and indeed most previous years, colonies in the north-west of Scotland appeared to suffer from low food availability in 2005, with Arctic terns, kittiwakes and puffins experiencing very low breeding success. For example, kittiwakes on Canna for the first time on record suffered breeding failure (Swann 2005b), and the species had the least successful season on record on Handa. On St. Kilda, puffins were very unsuccessful, due to apparent low availability of suitable prey (e.g. sandeels or sprats) –instead adults brought back large numbers of inedible pipefish to their chicks, many of which starved or were unlikely to fledge (Money 2005).

3 Species accounts

Nomenclature follows *Checklist of Birds of Britain and Ireland* (British Ornithologists Union 1992) and subsequent relevant BOURC updates published in *Ibis* and reported on www.bou.org.uk.

3.1 Red-throated diver *Gavia stellata*

In Shetland, it was another late breeding season, but the number of pairs nesting was high. Success was close to, or above, average in all areas, although productivity on Fetlar was still considered low. Few sandeels were fed to chicks, and many food items observed were young saithe. However, adults still managed to provision chicks with enough food to ensure high fledging rates. On Orkney, success was also above average at all sites studied despite an apparent shortage of food, although this was not to the extent noted in 2004. In NW Scotland, divers had above average success on Handa and Rum but productivity on Eigg was low. All nests on Coll failed due to bad weather.

Breeding numbers and breeding success (Figure 3.1.1, Table 3.1.1)

In **Shetland**, the number of pairs found nesting in regularly monitored areas was high, with overall breeding success slightly higher than the long-term mean and thus far greater than in 2004. The number of pairs nesting was at its highest on Fetlar and Yell since 2002, on Foula since 2001 and at Hermaness since 1998. In the Northmavine area, the number of occupied lochs (17) was on a par with that recorded in most years since 1989 (mean 15.0), although still less than half of that recorded during 1981-1983 (Heubeck 2005). On Fetlar, egg laying was late and more than half of the pairs had failed by the second week of June due to predation and flooding. Few sandeels *Ammodytes sp.* were delivered to chicks, with most prey items seemingly other fish species including flatfish (M. Smith, pers. comm.). Size comparisons of chicks at Hermaness with those on other lochs on Unst indicated that their development was 10-20 days behind, possibly due to later laying or poorer feeding conditions (Okill 2005a; Thomas 2005).

Table 3.1.1 Breeding success of red-throated diver, 2004 and 2005, and 1986-2004: figures are estimated number of chicks fledged per breeding pair (Shetland, NW Scotland) or occupied site (Orkney). Note that the number of pairs does not necessarily indicate total populations in study areas.

Region/site	2004		2005		1986-2004	
	Pairs	Fldg/pair	Pairs	Fldg/pair	Mean (\pm s.e.)	No. of years
Shetland						
Hermaness	6	0.83	9	0.89	0.90 (\pm 0.09)	19
Fetlar	20	0.25	24	0.54	0.53 (\pm 0.06)	19
Yell	6	0.00	10	0.80	0.52 (\pm 0.08)	16
Foula	9	0.44	11	0.64	0.47 (\pm 0.06)	19
Sample total	41	0.46	54	0.67	0.60 (\pm0.03)	19
Orkney						
Hoy	56	0.95	57	0.72	0.60 (\pm 0.04)	16
Rousay	-	-	4	1.00	0.32 (\pm 0.11)	13
Mainland	20	1.00	16	0.75	0.65 (\pm 0.07)	16
Sample total	76	0.96	77	0.74	0.58 (\pm0.04)	16
NW Scotland						
Handa	3	1.33	4	1.50	1.21 (\pm 0.09)	18
Rum	9	0.44	11	0.82	0.61 (\pm 0.06)	16
Eigg	2	0.50	3	0.33	0.75 (\pm 0.14)	19
Coll	10	0.60	11	0.00	0.64 (\pm 0.20)	4

In the Shetland Ringing Group's study area, 2005 was considered the most successful breeding season in the last decade, in sharp contrast to 2004, which was the worst since monitoring began in 1980 (Okill 2005a). Once again, territory attendance in spring was low, usually an early indication that some pairs will not attempt to breed. However, while some pairs began incubation at the normal time

it was noticeable that a second wave of birds began nesting 2-3 weeks later, presumably in response to improved feeding conditions which allowed birds to attain breeding condition late on. Water levels remained high, resulting in strong winds during the incubation period, which washed out some nests. Despite this, the number of successful pairs (those with chicks in July), at 53, was the highest recorded since 1997 (1980-2004 mean 50.2, s.d. ± 9.40), while the mean brood size at fledging, at 1.43, was at its highest since 1998 (1979-2004 mean, 1.35, s.e. ± 0.02). As in 2004, few sandeels were seen being delivered to chicks. Nearly all food items identified were saithe *Pollachius virens*, a fish with a lower calorific value than sandeels. However, adults seemed to successfully raise chicks on this food supply, unlike in 2004 when a shortage of sandeels late in the breeding season led to mortality of older chicks, despite adults continuing to feed chicks gadoids (Okill 2004, 2005a).

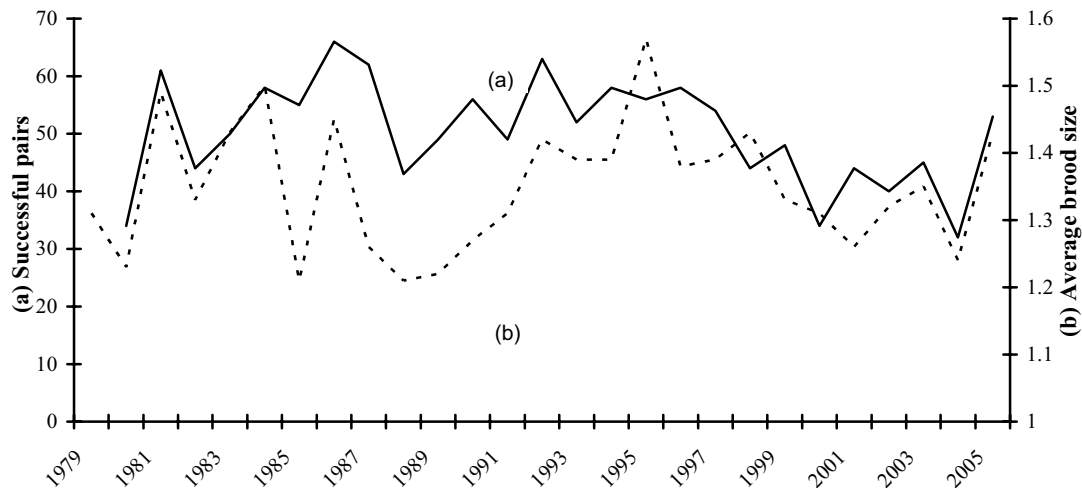


Figure 3.1.1 Annual variation in (a) numbers of 'successful' pairs (with chicks in mid-July) and (b) average brood-size near fledging at red-throated diver study areas in Shetland (parts of Unst, Eshaness, North Roe and Bressay), 1979-2005. Data are from Okill (2005a).

Divers had another successful year in **Orkney** where, although breeding success was lower than in 2004, it was well above the long-term mean for the islands. Success was also above the long-term mean at each of the three study sites. A detailed study was carried out on Hoy, where 138 nesting sites were checked, 57 of which were occupied although at five only a scrape was found (Williams and Williams 2005). Several sites that are normally occupied were empty, perhaps because some adults experienced low food availability and did not reach breeding condition. Nineteen nests failed, 12 of these during incubation, four at the chick stage and three at an unknown stage, so the number of successful nests was similar to 2004. As stated in previous reports, divers in Orkney only occasionally rear broods of two, compared with those nesting in Shetland, in which broods of two are more common. Eight two-chick broods were recorded in 2005, around half of that recorded in 2004, but above average for Hoy, where five or fewer such broods are usually raised. A shortage of available food was again apparent in 2005 but not to the extent of 2004. Consequently, although great skuas had another unsuccessful year, some were still present at colonies later in the season. Their potential to depredate diver nests and chicks over a longer period than in 2004 may have influenced the number of divers eventually successful.

In **north-west Scotland**, there were mixed levels of breeding success at the four colonies monitored. On Handa, success was high, at 1.50 chicks fledged per pair - the most successful year since 2000. On Rum, divers had their most successful breeding season since 1998; two pairs fledged broods of two, five pairs fledged broods of one and four pairs failed (S. Morris, pers. comm.). On Eigg, three pairs nested but only one was successful, fledging a single chick. Of the pairs that failed, one nest contained a single infertile egg and the other pair lost both chicks within one week of hatching (J. Chester, pers. comm.). No young fledged on Coll, where bad weather in early June washed out all 11 nests (S. Wellock, pers. comm.).

3.2 Northern fulmar *Fulmarus glacialis*

Between 2004 and 2005, numbers in most regions appeared relatively stable, although an increase was recorded in NE Scotland and a decrease in NE Ireland (though sample sizes there were low). Long-term trends indicated increasing numbers in Wales but declines in other regions since the mid 1990s. Mean breeding success was similar to 2004 but below the long-term average. Low levels of success were recorded in N and SE Scotland, with complete failure at two colonies, one in each region, although the reasons for this were not clear.

Breeding numbers (Tables 3.2.1 and 3.2.2, Figure 3.2.1)

In **Shetland**, there was little overall change in numbers since 2004. However, repeated counts of the number of apparently occupied sites (AOS) in sample plots indicated significant increases at Sumburgh Head ($t=3.648$, d.f.=8, $p<0.05$) and Burravoe ($t=2.892$, d.f.=8, $p<0.05$) but significant decreases at Eshaness ($t=2.621$, d.f.=8, $p<0.05$) and Troswick Ness ($t=3.568$, d.f.=8, $p<0.001$). At the last site, where numbers have fallen by 42% since the peak count of 1,214 AOS in 2000, part of the decline is attributed to the presence of mammalian predators; cats *Felis catus* were seen in one sub-colony with ferret *Mustela furo* droppings found near another (Heubeck 2005). On Fair Isle, a large proportional increase in numbers occurred in plots used to monitor breeding success, although 266 AOS was still the second lowest count on record there (Shaw *et al.* 2005). In **Orkney**, following the declines reported at Marwick Head and Noup Cliffs (Mavor *et al.* 2005), numbers on Copinsay also decreased, from 1,182 AOS to 417 since 1999. However, the early count date in 2005 compared with the previous count (18 May vs. 27 May) may have falsely exaggerated this decline (Meek 2005).

Table 3.2.1 Regional population changes at monitored northern fulmar colonies, 2004-2005 (apparently occupied sites in late May or June). Counts with a reported inaccuracy of $> \pm 5\%$, and regional samples < 100 AOS, are excluded. Except where otherwise indicated, regional totals are derived from single complete counts of the colonies listed below. Statistical significance of trends (t-test) indicated as: n.s. not significant, * $P < 0.05$, *** $P < 0.001$. Further details of calculation of trends are given in section 1.2.2.

Region	2004	2005	2004-2005 % change	% annual change
SW Scotland ^a	1,819	1,819	0.0	-1.2 n.s. 1993-2004
NW Scotland ^b	889	898	+1.0	-1.3 * 1986-2004
Shetland ^c	1,944	1,988	+2.3	+0.5 n.s. 1986-2004
NE Scotland ^d	125	179	+43.2	-
SE Scotland ^e	1,602	1,429	-10.8	+0.2 n.s. 1986-2004
NE England ^f	408	425	+4.2	+0.4 n.s. 1986-2004
Wales ^g	1,108	1,145	+3.3	+1.7 *** 1986-2004
NE Ireland ^h	112	76	-32.1	-

Colonies: ^a Coll, Lunga, Colonsay (sample areas), Sanda; ^b Canna, Eigg, Handa (plot counts); ^c Hermaness (productivity plot), Eshaness (plot counts), Burravoe (plot counts), Troswick Ness (plot counts), Sumburgh Head (plot counts), Fair Isle (productivity plots); ^d Sands of Forvie; ^e Isle of May, Inchkeith, Inchgarvie, Inchmickery, Inchcolm, The Lamb, Craigleith, Fidra, Tantallon, Bass Rock; St. Abb's Head; ^f Farne Islands, Coquet Island, Saltburn, Boulby Cliff; ^g Caldey, St Margaret's Island, Stackpole Head plus Elegug Stacks and adjacent coastline, Skomer, Bardsey, South Stack, Lochtyrn (plots), New Quay (plots); ^h Isle of Muck, Copeland Islands.

In **north Scotland**, numbers in sample plots increased by 50.3% overall to 920 AOS since previously counted, in 1999. Significant increases were observed at Iresgeo (50.1%, to 497 AOS, $t=11.162$, d.f.=3, $p<0.01$) and An Dun (55.7%, to 366 AOS, $t=5.846$, d.f.=3, $p<0.01$) over that period, with non-significant changes recorded at smaller colonies around Badbea and Skirza Head (Swann 2005). However, numbers have declined in this region since 1990, although monitoring has been carried out infrequently over the last decade.

In **south-west** and **north-west Scotland**, numbers appeared to be stable between 2004 and 2005, although the trend in both regions has been downward since the mid-1990s. Proportional changes at most colonies were in the range of $\pm 10.0\%$, except in the small colony at Mull of Galloway. No significant change was noted in sample plots on Handa. On St. Kilda, monitoring of sample plots revealed a non-significant decline of 9.4%, to 1,217 AOS since 2003 (Money 2005). Whole-colony counts at North Rona and Priest Island revealed decreases of 25.7% (to 2,616 AOS) and 20.3% (to 169 AOS), respectively, these having occurred since 1998 at the first site and since 2002 at the latter. On Haskeir, 1,621 AOS were counted, compared with 950 in 2002, which is now regarded as an underestimate.

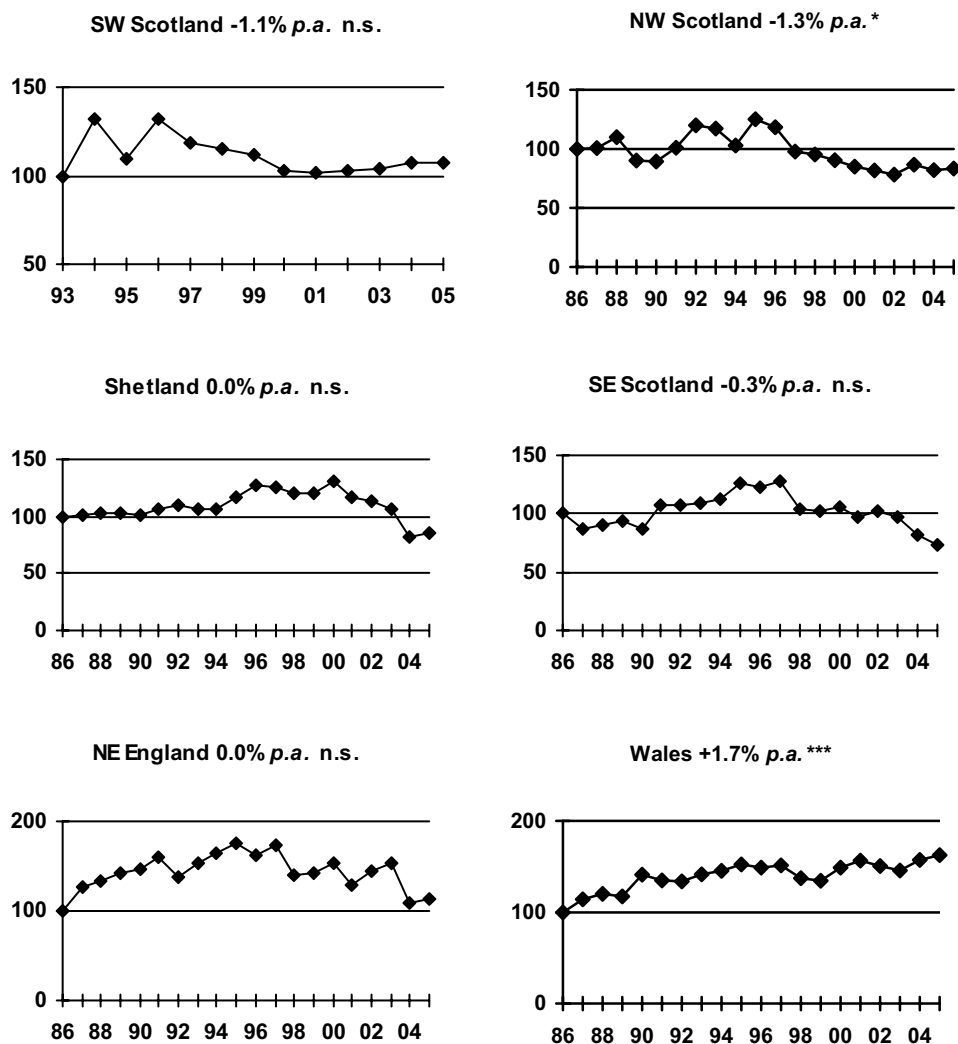


Figure 3.2.1 Regional population indices for breeding northern fulmars, 1986-2005 (apparently occupied sites in June). Average annual rates of change were calculated by regression of natural log of index against year (see section 1.2.2. for details). Unless otherwise indicated, three or more colonies were counted in each year. Statistical significance of trends indicated as: n.s. not significant, * $P < 0.05$, *** $P < 0.001$.

After four consecutive years of decreases, numbers at the Sands of Forvie NNR (**north-east Scotland**) increased, though numbers were only half that recorded during the peak count, in 2000. In **south-east Scotland**, a decline of 10.8% was recorded overall, continuing the downward trend evident since 1997. Large proportional increases were noted on the Isle of May, Fidra, Inchmickery and the Bass Rock although numbers were small at the last two colonies. Notable declines were recorded on Craigeleith and Inchcolm, while numbers on Inchkeith, Inchgarvie and at St. Abb's Head were stable. In **north-east England**, although numbers were stable between 2004 and 2005 a downward trend was

apparent since the mid-1990s, despite occasional periods of slight increase. The largest proportional change occurred on the Farne Islands, with smaller changes noted elsewhere. However, a survey of Marsden Cliffs found numbers had increased by 67.6% to 248 AOS since 1999 (G. Siggens, pers. comm.).

Table 3.2.2 Population changes of northern fulmar 2004-2005 and 1986-2004 at selected sites referred to in the text. P\W indicates plot or whole-colony counts.

Region/Site		2004	2005	2004-2005 % change	1986-2004 Mean (\pm s.d.)	No. of years
SW Scotland						
Coll	W	144	158	+9.7	131 (32)	8
Colonsay	W	596	550	-7.7	599 (64)	13
Lunga	W	547	587	+7.3	536 (82)	12
Mull of Galloway	W	32	24	-25.0	51 (20)	19
NW Scotland						
Handa	P	282	280	-0.7	301 (18)	4
Canna	W	436	439	+0.7	505 (92)	19
Eigg	W	171	179	+4.7	162 (35)	18
Shetland						
Troswick Ness	P	815	704	-13.6	985 (129)	19
Sumburgh Head	P	194	231	+19.1	236 (29)	15
Burravoe	P	157	192	+22.3	166 (26)	18
Eshaness	P	308	280	-9.1	361 (30)	9
Hermaness	P	190	147	-22.6	289 (43)	16
Fair Isle	P	160	266	+66.2	349 (72)	12
NE Scotland						
Sands of Forvie	W	125	179	+43.2	265 (64)	16
SE Scotland						
Isle of May	W	236	276	+16.9	283 (68)	17
St. Abb's Head	W	153	158	+3.3	306 (62)	19
Inchkeith	W	306	302	-1.3	447 (82)	18
Inchgarvie	W	206	201	-2.4	175 (52)	15
Fidra	W	204	127	+37.7	204 (57)	19
Inchmickery	W	24	41	+70.8	25 (11)	16
Inchcolm	W	205	131	-36.1	191 (41)	14
Craigleith	W	136	62	-54.4	161 (29)	17
Tantallon	P	85	82	-3.5	106 (15)	6
Bass Rock	W	40	45	+12.5	86 (47)	11
NE England						
Farnes	W	156	176	+12.8	235 (32)	19
Coquet	W	32	34	+6.2	55 (15)	18
Huntcliff	W	110	115	+4.5	118 (42)	15
Boulby Cliff	W	110	100	-9.1	116 (20)	15
Wales						
Lochtyn	P	6	5	-16.7	6 (-)	1
New Quay	P	18	14	-22.2	18 (-)	1
Skomer	W	730	726	-0.5	658 (66)	19
Elegug Stacks	W	14	21	+50.0	26 (8)	9
Skokholm	P	10	14	+40.0	14 (6)	2
St Margaret's Island	W	13	15	+15.4	10 (6)	12
Stackpole Head	W	36	45	+25.0	44 (6)	7
	P	26	27	+3.8	28 (3)	9
Bardsey	W	45	42	-6.7	38 (8)	17
South Stack	W	44	19	-56.8	32 (14)	13
Caldey	W	98	115	+17.3	92 (21)	18
NE Ireland						
Isle of Muck	W	74	36	-51.4	46 (22)	4
Copeland Islands	W	38	40	+5.3	30 (7)	6

In **Wales**, overall numbers remained stable between 2004 and 2005. No significant changes were noted at colonies where monitoring was undertaken using sample plots; plots held few AOS, year-to-year variation was high and few sample years were available for analysis. Complete surveys of the two largest colonies revealed an increase on Caldey but almost no change on Skomer. All other sites monitored via whole-colony counts numbered fewer than 50 AOS; large proportional increases were noted at Elegug Stacks, Stackpole Head and St. Margaret's Island, with a large decrease recorded at South Stack. The region's population index continued to show a highly significant upward trend since 1986. In **north-west** and **south-west England**, overall numbers were stable between 2004 and 2005, although in neither region was monitoring undertaken at sizeable colonies: sample colonies held 82 and 52 AOS, respectively, in 2005. The sample colony in **north-east Ireland** decreased by 32.1% between 2004 and 2005, the largest decline recorded in any region. This was due to a fall in the number recorded on the Isle of Muck, because the number on the Copeland Islands remained stable.

Breeding success (Tables 3.2.3 and 3.2.4)

Mean productivity of northern fulmar across 33 sites in Britain and Ireland in 2005 was 0.35 (s.e. ± 0.03) chicks per AOS, below the 1986-2004 mean of 0.42 (s.e. ± 0.01) recorded from between 13 to 41 colonies annually. There was no statistically significant difference between 26 colonies monitored in both 2004 and 2005.

Table 3.2.3 Northern fulmar breeding success grouped regionally, 2004-2005: estimated number of chicks fledged per apparently occupied site at sample colonies (superscript n = number of colonies). Figures are based on regularly occupied sites or on the average numbers of occupied sites in June, and are presented as the means and standard errors of figures for individual colonies. Changes in breeding success are indicated for colonies where similar methods have been used in both years. None of these is statistically significant.

Region	2004 chicks fledged/site				2005 chicks fledged/site				2004-2005 change	
	AOS ⁿ	Range	Mean	\pm s.e.	AOS ⁿ	Range	Mean	\pm s.e.	Mean ⁿ	\pm s.e.
SW Scotland ^a	151 ²	0.63-0.86	0.74	± 0.12	164 ²	0.61-1.00	0.80	± 0.20	+0.06 ²	± 0.08
NW Scotland ^b	373 ²	0.30-0.54	0.42	± 0.08	600 ³	0.31-0.42	0.35	± 0.04	-0.10 ²	± 0.12
Shetland ^c	2,309 ⁸	0.16-0.46	0.31	± 0.04	2,387 ⁸	0.17-0.48	0.34	± 0.03	+0.05 ⁷	± 0.02
Orkney ^d	794 ⁸	0.06-0.51	0.19	± 0.06	716 ⁷	0.18-0.50	0.35	± 0.05	+0.14 ⁷	± 0.09
N Scotland ^e	90 ²	0.02-0.04	0.03	± 0.01	76 ²	0.00-0.07	0.04	± 0.04	+0.01 ²	± 0.02
SE Scotland ^f	182 ²	0.00-0.21	0.10	± 0.10	217 ²	0.00-0.27	0.14	± 0.14	+0.03 ²	± 0.03
NE England ^g	164 ²	0.38-0.45	0.42	± 0.04	211 ³	0.23-0.57	0.38	± 0.10	+0.04 ²	± 0.07
Wales ^h	282 ²	0.49-0.55	0.52	± 0.03	126 ¹	-	0.49	-	0.00 ¹	-
Isle of Man ⁱ	99 ⁴	0.00-0.53	0.30	± 0.11	107 ⁴	0.20-0.44	0.32	± 0.06	+0.02 ⁴	± 0.12
NE Ireland ^j	38 ²	0.63-0.88	0.76	± 0.12	40 ²	0.27-0.44	0.36	± 0.08	-0.40 ²	± 0.21
Total	4,482 ³⁴	0.00-0.88	0.33	± 0.04	4,644 ³⁴	0.00-0.57	0.35	± 0.03	+0.02³¹	± 0.04

Colonies: ^a Ailsa Craig, Ben Feall; ^b Handa, St. Kilda (2005 only), Canna; ^c Hermaness, Burra, Fetlar (2004 only), Eshaness, Noss, Troswick Ness, Sumburgh Head, Foula (2005 only), Fair Isle; ^d Costa Head, Mull Head, Gultak, Rousay, Papa Westray, Hoy, North Ronaldsay (2004 only), Eynhallow; ^e Easter Ross, Wilkhaven; ^f Isle of May, Tantallon; ^g Farne Islands, Coquet (2004 only), Marsden Cliffs (2005 only); ^h Skomer, Skokholm (2004 only); ⁱ Glen Maye, Bradda, Glen Mooar-Gob y Deigan, Cass Strooan-Peel Headlands; ^j Old Lighthouse Island, Big Copeland Island.

The lowest levels of success were noted in **north Scotland**, where fulmars at North Sutor fledged 0.07 chicks per AOS and those at Wilkhaven failed completely. This was the third year in succession when breeding success was less than 0.10 at each of these colonies. In **south-east Scotland**, low levels of success have also been a feature of the colony at Tantallon since 2002; as in 2004, complete failure was again recorded in 2005 (*cf.* 0.01 and 0.04 chicks fledged per AOS in 2002 and 2003, respectively). The reasons for such low levels of success over a number of years at the above three colonies are unclear. Elsewhere in south-east Scotland, fulmars nesting on the Isle of May were marginally more

successful than in 2004 although breeding success was still well below average for the site. Losses appeared to be equally divided between the egg and chick periods (Harris *et al.* 2005).

Table 3.2.4 Breeding success (chicks fledged per AOS) of northern fulmar 2004-2005 and 1986-2004 at selected sites referred to in the text. Figures in parentheses under 2002 and 2003 are the number of occupied sites from which the success estimate was derived. * Number of chicks fledged per egg laid.

Region/site	2004	2005	1986-2004	
			Mean (\pm s.e.)	No. of years
SW Scotland				
Ben Feall	0.63 (144)	0.61 (158)	0.63 (-)	1
Ailsa Craig	0.86 (7)	1.00 (6)	0.72 (0.03)	13
NW Scotland				
St. Kilda	-	0.42 (232)	0.38 (0.02)	12
Canna	0.54 (91)	0.31 (89)	0.40 (0.02)	19
Handa	0.30 (282)	0.32 (279)	0.47 (0.03)	16
Shetland				
Hermaness	0.29 (354)	0.29 (320)	0.42 (0.03)	16
Noss	0.31 (167)	0.34 (193)	0.40 (0.03)	12
Eshaness	0.16 (308)	0.35 (280)	0.42 (0.02)	19
Burravoe	0.32 (157)	0.34 (192)	0.31 (0.01)	2
Troswick Ness	0.17 (815)	0.17 (704)	0.40 (0.02)	19
Sumburgh Head	0.32 (194)	0.37 (229)	0.45 (0.03)	19
Fair Isle	0.43 (171)	0.48 (266)	0.44 (0.02)	19
Foula	-	0.38 (203)	0.40 (0.03)	6
Orkney				
Papa Westray	0.26 (58)	0.27 (82)	0.51 (0.06)	9
Rousay	0.51 (57)	0.41 (56)	0.53 (0.04)	13
Costa Head	0.10 (164)	0.44 (120)	0.47 (0.03)	16
Mull Head	0.06 (167)	0.50 (164)	0.39 (0.03)	16
Gultak	0.08 (139)	0.44 (90)	0.40 (0.04)	16
Hoy	0.40 (90)	0.22 (116)	0.47 (0.03)	10
Eynhallow	0.06 (70)	0.18 (88)	0.06 (-)	1
N Scotland				
Easter Ross	0.04 (46)	0.07 (41)	0.17 (0.04)	11
Wilkhaven	0.02 (44)	0.00 (35)	0.25 (0.08)	8
SE Scotland				
Isle of May	0.21 (97)	0.27 (135)	0.41 (0.02)	19
Tantallon	0.00 (85)	0.00 (82)	0.32 (0.05)	18
NE England				
Farne Islands	0.45 (132)	0.57 (133)	0.54 (0.03)	19
Coquet Island	0.38 (32)	0.35 (34)	0.47 (0.06)	8
Marsden Cliffs	-	0.23 (44)	-	-
NW England/Isle of Man				
Glen Maye	0.53 (28)	0.22 (32)	0.36 (0.04)	18
Bradda	0.41 (29)	0.44 (32)	0.32 (0.04)	13
Glen Mooar – Gob y Deigan	0.25 (31)	0.25 (34)	0.24 (0.05)	6
Peel Headlands	0.00 (10)	0.20 (9)	0.37 (0.13)	4
Wales				
Skomer	0.49 (132)	0.49 (126)	0.54 (0.04)	13
Bardsey *	0.87 (45)	0.88 (42)	0.79 (0.08)	9
NE Ireland				
Old Lighthouse Island	0.88 (8)	0.27 (15)	0.53 (0.14)	6
Big Copeland Island	0.63 (30)	0.44 (25)	0.63 (-)	1

In **north-east England**, fulmars on the Farne Islands were very successful, perhaps atypically so considering data from other east coast regions in 2005, fledging 0.57 chicks per AOS. This value was slightly above the site mean and much higher than in 2004 (Walton *et al.* 2005). On Coquet Island, breeding success was only slightly lower than in 2004 but equal to the 2005 national mean.

At Marsden Cliffs, where data had not previously been collected, breeding success was 0.23 chicks per AOS (G. Siggins, pers. comm.).

In most other regions, breeding success in 2005 was generally similar to or higher than the UK mean. Mean breeding success was highest in **south-west Scotland**, partly because on Ailsa Craig only 6 AOS (6) were available for monitoring and all fledged young. However, elsewhere in the region, high levels of success were again recorded on Coll, where more sites were monitored. Excluding colonies where few nests are monitored (and Bardsey, where a different method is used), Coll was the most successful colony in the UK in 2004 and 2005, approximately 10-15% more successful than any other site in those years. **North-west Scotland** was one of two regions where breeding success was less than in 2004, although the decrease was not statistically significant. On Handa and Canna, success was well below the respective colony means and at the latter site was partly reduced due to depredation of chicks by white-tailed eagles *Haliaeetus albicilla* from one study plot (Swann 2005a). On St. Kilda, breeding success was close to the long-term mean.

On **Shetland**, mean breeding success and the range of values recorded in 2005 were similar to 2004. At individual colonies, an exception to this pattern was Eshaness, where fulmars were more than twice as successful in 2005. Only on Fair Isle and at Burravoe was success in 2005 higher than the respective colony means, although few years' data have been collected at the latter site. Mean breeding success on **Orkney** in 2005 showed a marked increase compared with 2004, when many colonies recorded low levels of productivity, but the increase was not statistically significant. At Mull Head, Costa Head and Gultak - three colonies that performed particularly poorly in 2004 - breeding success was close to or above the respective long-term means (Paice 2005). At Eynhallow, breeding success was again low although fulmars there were three times more successful than in 2004. Only on Hoy and Rousay did fulmars produce fewer chicks than in 2004; however, at the latter site success was still relatively high, at 0.41. Breeding success on Papa Westray was similar to 2004 but below the long-term mean for this colony which, like Rousay, has tended to be more productive than others in the region (Meek 2005).

In regions around the Irish Sea overall levels of breeding success were moderately high. On **Isle of Man**, mean success was similar to 2004. At Peel Headlands, Glen Maye and between Glen Mooar and Gob y Deigan productivity was generally quite low, although close to average for the latter site; there was no repeat of the complete failure which occurred at Peel Headlands in 2004. Colonies in **Wales** were again highly successful, with breeding success on Skomer and Bardsey equal to that recorded in 2004 and well above the long-term mean at the latter site. **North-east Ireland** recorded the largest fall in breeding success between 2004 and 2005, although this was not statistically significant. Productivity declined on both Old Lighthouse Island - where success was only half that of the long-term mean - and on Copeland Island, although, in national terms, birds were still relatively successful there.

3.3 Manx shearwater *Puffinus puffinus*

Breeding numbers and breeding success (Table 3.3.1)

In **north-west Scotland**, breeding success on Rum was well below the long-term average and the lowest recorded since 1999. As was the case in 2004, five rat-depredated eggs were found, three of which were in a sub-colony where a brown rat *Rattus norvegicus* was seen at night, although it is not known if the eggs had already been abandoned (Ramsay 2005). In addition, all the study burrows in a 50m² area in this sub-colony failed. Together with 2004, these are the only seasons where rat activity has been observed in the colony since monitoring plots were established in 1994. There is concern that rat activity in the colony is having adverse effects on the number of young produced. Only 288 young were ringed in 2005, compared with over 700 caught in the same area in 1974. Furthermore, in contrast to 1974, ringing visits in 2005 targeted peak fledging dates. Trapping in the mid-1980s found very low densities of rats in the colonies and only four depredated eggs, which had previously been abandoned, were found during intensive studies in 1984 and 1985 (Thompson 1987). Clearly, further work is required to determine if rat activity has increased, and if their presence is having a detrimental impact on the shearwaters. On Canna, where shearwaters ceased to breed in 2002, taped calls were played at the entrances of 50 burrows in one sub-colony where the remains of one depredated adult were found, but again failed to elicit any responses (Swann 2005a). The most successful colony in the UK was again on Sanda (**south-west Scotland**), where fledging rates in 2004 and 2005 appeared to be approximately 20% higher than at other colonies. Elsewhere in the region several calling birds were heard at night in early June on the Garvellachs (Firth of Lorn), following earlier reports of rafting birds in this area on summer evenings; breeding was not confirmed, however (M. Parsons, pers. obs.).

Table 3.3.1 Breeding success of Manx shearwaters (chicks fledged per AOB or egg), 2004-2005 and 1986-2004. Figures in parentheses under 2004 and 2005 indicate the number of occupied burrows from which success was derived.

Region/site	2004	2005	1986-2004 mean	
			Mean (\pm s.e.)	No. of years
NW Scotland				
Rum	0.62 (106)	0.57 (110)	0.69 (0.04)	12
SW Scotland				
Sanda	0.97 (65)	0.95 (60)	0.88 (0.07)	4
Wales				
Skomer	0.53 (97)	0.56 (122)	0.56 (0.04)	14
Bardsey	0.80 (100)	0.79 (150)	0.81 (0.01)	9

In **Wales**, breeding success at both colonies monitored was similar to 2004 and also close to the long-term means at each. On Bardsey, out with the study area, a pair of carrion crows *Corvus corone* depredated eggs (for the fourth successive year), removing as many as 35 from accessible nest chambers (Stansfield 2005).

On Skomer, a series of sample plots were set-up during the last full census in 1998. Annual surveys, using tape playback, reveal a significant upward trend in the number of responses since then. In 2005, 1,052 responses were obtained from the plots (*cf.* 821 responses 1998; 1998-2004 mean = 866 responses, s.d. \pm 57). Since 2000, breeding success has been consistently lower than at other colonies; reasons for failure of 40 nests were as follows: 13 eggs were abandoned, eight were broken, three shearwaters were evicted (two by puffins and one by another shearwater), one burrow collapsed and the remaining 15 either failed at the egg stage or when the chicks were very young. The estimated adult survival rate, at 90% for 2003 (the most recent year for which an estimate is available), although slightly higher than the long-term mean (85%, 1977-2002, s.d. \pm 9) is considered low compared with an earlier more detailed study of the species on Skokholm and to the expected value for a species with such a low reproductive rate. However, there is no discernable trend over this period (Perrins 2005).

3.4 European storm-petrel *Hydrobates pelagicus*

Breeding number and breeding success

There are inherent difficulties in censusing petrels accurately, arising from their patchy distribution and nocturnal habits, the presence of non-breeders and the siting of nests deep within burrows, cavities or crevices in remote areas. However, a standardised method for repeatable surveys has been developed, involving the use of diurnal play-back of the male's "purr" song (Gilbert *et al.* 1998a,b; Ratcliffe *et al.* 1998). Other methods are also used to monitor populations on an annual basis.

Birds on Mousa (**Shetland**) have experienced late breeding seasons since 1997 (with the exception of 2000). Breeding sites on this island were visited on 10 September and 41 chicks were ringed (*cf.* 34 in 2004, 50 in 2003, 47 in 2002, 35 in 2001, 49 in 2000 and 38 in 1999). A further two chicks were too small to ring; four incubating adults, one dead chick and 10 failed eggs were also recorded and it was estimated that most chicks would not have fledged until after the end of September. Some sites were very wet, which could have contributed to the number of failed eggs (Okill 2005b). Three nocturnal searches on Noss in mid August elicited no responses to tape play-back (Sykes and Bliss 2005).

On Shillay (**north-west Scotland**), a tape play-back survey at two sample plots elicited 18 and 35 responses, compared with 25 and 27, respectively, in 2004. A steady downward trend was noted in the first plot since 2002 (A. Johnson, pers. comm.). On Priest Island, where complete censuses are carried out at 5-year intervals, a tape play-back survey in 2004 indicated a substantial decrease from 1999. It was, however, difficult to know whether this was a genuine decline in numbers or whether poor breeding conditions in 2004 led to low levels of burrow attendance. In order to monitor population trends more accurately, sample plots were established in 2005 that will be surveyed annually over a five-year period (Insley *et al.* 2005). In the Village Bay area of Hirta, St. Kilda, a tape play-back survey estimated 39 apparently occupied sites (AOS) (95% CLs 28-63), which represents a substantial decline from the 76 AOS (95% CLs 63-124) found in 1999 (M Parsons pers. obs.). In **south-west Scotland**, a tape play-back survey of built structures in the North Village on Lunga, Treshnish Isles, found a minimum of 30 AOS, which suggests no decline since the area was last surveyed, in 2001, when 25 AOS was found. A tape play-back survey of the boulder beach on Lunga, which held ca. 450 AOS in 2001, revealed very few AOS; it was thought that a storm may have rendered the site largely unsuitable for breeding (Ward 2005).

On Bardsey Island (**Wales**), a tape play-back survey elicited a minimum of 55 responses, although coverage of the island was incomplete (Stansfield 2005). On Skomer Island, the 2004 playback estimate was revised to 328 AOS (95% CLs 282-398) (*cf.* 206 in 2003). Two suspected new sub-colonies were surveyed in 2005; one smelt strongly of storm-petrels when visited in mid-July, but no responses were elicited from either site.

3.5 Leach's storm-petrel *Oceanodroma leucorhoa*

Breeding number and breeding success

On North Rona (**north-west Scotland**), an incomplete survey at the Village area Group A, C and part of B elicited 122 responses (*cf.* 142 in 2001). The number of responses in Group A, at 62, was very similar to that in 2001 (68), while in Group C responses increased from 37 in 2001 to 50 in 2005. Leach's storm-petrels have long been suspected to breed on Haskeir (NW of North Uist), but a daytime tape play-back survey did not elicit any responses. However, nocturnal play-back elicited responses from birds in flight and from those in burrows, suggesting the presence of breeders (Winn 2005). On Hirta, St. Kilda, repeated tape play-back surveys were carried out in a plot encompassing 20 cleits near the Lover's Stone, which elicited a response from a total of 62 AOS, an apparent decline of 14 % from the same plot in 2003 (Money 2005).

3.6 Northern gannet *Morus bassanus*

Breeding numbers (Figure 3.6.1)

In 2005, counts carried out at both colonies in the **Channel Islands** – Ortac and Les Etacs – found 2,547 AOS and 4,862 AOS, respectively (Sanders and Harris, *in press*). Since 1999, when estimates were derived for each from aerial photographs as part of Seabird 2000 (Mitchell *et al.* 2004), this represents an increase of 40.9% on Les Etacs, although the population on Ortac changed little (+1.9%). At the latter site numbers have remained fairly stable over the period of the SMP, suggesting that the colony is near capacity. In contrast, the gannetry on Les Etacs has grown steadily and although the annual rate of increase was relatively low compared with some colonies, it was statistically significant.

On Fair Isle (**Shetland**), the northern gannet population increased steadily between 1986 and 2000 (average increase 10% per annum) and more rapidly between 2000 and 2003 (average increase 17% per annum). Since then the population has stabilised, with 1,817 AON recorded in 2005 compared with 1,866 and 1,875 AON in 2003 and 2004, respectively. However, these recent minor changes were within that expected due to annual differences between the timing of breeding and surveying. The growth of the colony also reached a plateau between 1996 and 2000 so the current situation may be just a temporary feature. On Sheep Rock, the newest and fastest growing sub-colony, where there is ample room for expansion, numbers were similar between 2004 and 2005 (23 and 25 AON, respectively) (Shaw *et al.* 2005).

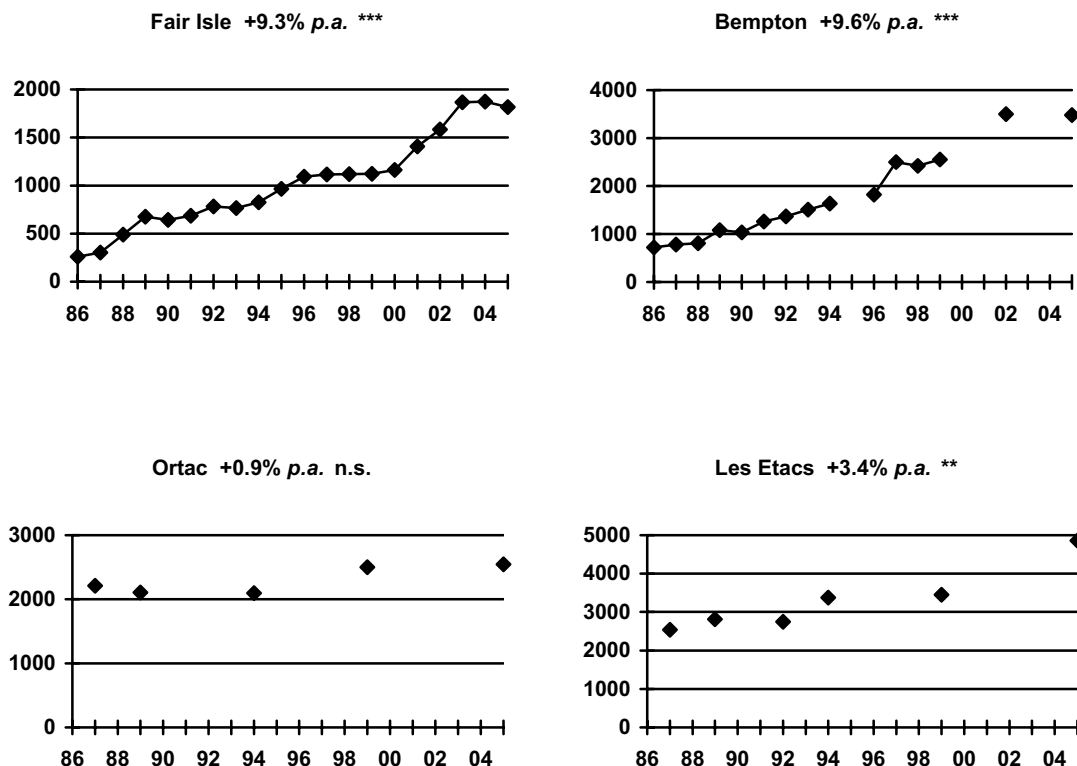


Figure 3.6.1 Northern gannet population trends at four colonies, 1986-2005 (apparently occupied nests or sites in June). Average annual rates of change were calculated by regression of natural log of index against year (see section 1.2.2. for details).

Statistical significance of trend indicated as: n.s. not significant, ** $P < 0.01$, *** $P < 0.001$.

At Bempton (**east England**), there is also an indication that numbers have stabilised in recent years, but again numbers at this colony have apparently reached a plateau in the past, most recently between 1997-99, before increasing thereafter. In 2005, 3,480 AON were recorded compared with 3,498 AON in 2002.

The small colony at Noup Head, Westray (**Orkney**), which became established in 2003, almost doubled in size between 2004 and 2005, to 27 AON (Meek 2005).

All other gannetries in Britain and Ireland were censused in 2003 or 2004, as part of a decadal programme which attempts to survey all colonies over a short time period (Mavor *et al.* 2005; Wanless *et al.* 2005b). Using updated figures for those colonies counted in 2005, together with those from colonies covered in the preceding two years, indicated a total population of 261,561 AOS for Great Britain, Ireland and the Channel Islands, an increase of 13.0% since the last full survey in 1994-95 (*cf.* +24.0% between the complete surveys of 1984-88 and 1994-95).

Breeding success (Table 3.6.1)

Mean productivity in 2005 was 0.67 (s.e. ± 0.04) chicks per AON, from five monitored colonies, compared with the 1986-2004 long-term mean of 0.69 (s.e. ± 0.01) chicks per AON measured at between three and six colonies annually.

In **Shetland**, breeding success at the three monitored colonies was generally equal to or above that recorded in 2004. On Hermaness, it was the most successful breeding season since 1999, with productivity slightly above the colony average. On Noss and Fair Isle, breeding success was close to the long-term colony means.

On Ailsa Craig (**south-west Scotland**), it was again noted as being a late season, with some adults apparently still incubating eggs in mid-August. These nests probably failed but breeding success was still slightly higher than average, at 0.74 chicks per AON (B. Zonfrillo, pers. comm.).

Table 3.6.1 Northern gannet breeding success 2004 and 2005, and 1986-2004: estimated number of chicks fledged per occupied nest. Productivity is shown as the mean and standard error of figures from sample plots (superscript n = number of plots) where applicable.

Colony	2004 fledged/nest		2005 fledged/nest		1986-2004 fledged /nest	
	AON ⁿ	Mean (\pm s.e.)	AON ⁿ	Mean (\pm s.e.)	Mean (\pm s.e.)	Years
SW Scotland						
Ailsa Craig	247 ²	0.72 (± 0.04)	244 ²	0.74 (± 0.12)	0.70 (± 0.02)	14
Shetland						
Hermaness	702 ³	0.61 (± 0.02)	836 ³	0.69 (± 0.03)	0.65 (± 0.01)	16
Noss	460 ⁴	0.69 (± 0.04)	494 ⁴	0.69 (± 0.02)	0.70 (± 0.01)	19
Fair Isle	231 ¹	0.68 (-)	218 ¹	0.71 (-)	0.69 (± 0.02)	19
Orkney						
Noup Head	14 ¹	≤ 0.79 (-)	27 ¹	0.52 (-)	≤ 0.79 (-)	1
NE Scotland						
Troup Head	1,547 ¹	0.65 (-)	-	-	0.60 (± 0.04)	7
All colonies	3,201 ⁶	0.69 (± 0.03)	1,819 ⁵	0.67 (± 0.04)	0.69 (± 0.01)	19

At Noup Head on Westray (**Orkney**), the colony of 27 AON held 14 large chicks on 2 September (Meek 2005); productivity is usually lower at newly formed colonies, because colonizing birds tend to be less experienced breeders than most birds at established sites.

3.7 Great cormorant *Phalacrocorax carbo*

Between 2004 and 2005, numbers were stable in most regions, although an increase was noted in NW Scotland and decreases occurred in SE Ireland and N and SE Scotland. The decreases in the last two regions were linked to a wreck of shags and cormorants reported in late winter/early spring of 2005. Long-term trends indicate that numbers increased inland and in regions adjacent to the northern part of the Irish Sea. Fledging rates were generally below average.

Breeding numbers (Tables 3.7.1 and 3.7.2, Figure 3.7.1)

North-west Scotland, where both colonies held more birds than in the previous year, was the only region where cormorant numbers increased to any great extent. Numbers in 2004 were depressed (by some unknown factor), as opposed to having genuinely decreased as comparable samples show numbers to be reasonably stable in recent years. Numbers in **south-west Scotland** were stable between 2004 and 2005, albeit with notable proportional changes at the two largest colonies sampled, Lady Isle and Port o' Warren. Three other small colonies increased by more than 10%. Elsewhere in the region, five colonies have been deserted within the last decade.

Table 3.7.1 Regional population changes at monitored great cormorant colonies, 2004-2005 (apparently occupied nests in May-June). Regional samples of fewer than 50 AON or of only one colony are excluded. Trends for 1986-2004 are average annual rates of change shown by sample populations. Significance of trends indicated as: n.s. not significant, * P < 0.05, *** P < 0.001). Further details of calculation of trends are given in section 1.2.2.

Region	2004	2005	2004-2005 % change	% annual change
SW Scotland ^a	284	302	+6.3	+0.2 n.s. 1986-2004
NW Scotland ^b	60	83	+38.3	-
N Scotland ^c	279	220	-21.1	-3.1*** 1986-2004
SE Scotland ^d	363	239	-34.2	-0.6 n.s. 1986-2004
NE England ^e	256	254	-0.8	-1.1* 1986-2004
Inland England ^f	154	168	+9.1	+10.4%*** 1986-2004
SE England ^g	239	252	+5.4	-
SW England ^h	202	206	+2.0	-1.9*** 1986-2004
Wales ⁱ	920	803	-12.7	+0.8 n.s. 1986-2004
NW England/Isle of Man ^j	253	241	-4.7	+5.6*** 1986-2004
NE Ireland ^k	442	490	+10.9	+7.1*** 1986-2004
SE Ireland ^l	501	352	-29.7	-

Colonies: ^a Sanda, Lady Isle, Port o' Warren, Ruadh Sgeir, Corr Eilean, Carraig an Daimh, Eilean Dubh, Sgat Mor; ^b An Glas Eilean, Loch an Tomain; ^c Stacks of Occumster, Ceann Leathad, Traigh Bhuidhe, Neuk Mhor, Ord Point, Cnoc na Stri, North Sutor; ^d Carr Craig, Haystack, The Lamb, Inchkeith, Inchmickery; ^e Farne Islands, Huntcliff, Boulby Cliff; ^f Rutland Water, Aldermaston; ^g Dungeness, Rye Harbour; ^h Ballard Cliff, White Nothe, Gad Cliff, Carsewell Cove, Thatcher Rock, Burgh Island; ⁱ Llangranog, Penderi, South Stack, Skomer, St Margaret's Island, Ynysoedd Gwylan, Ynys Traws, Craig yr Aderyn, Great Orme, Little Orme, Ynys yr Adar; ^j South Solway, St. Bee's Head, Grune Point, Gob ny Skeddán, Peel Hill, Conray Head to Traie Cronkan; ^k Strangford Lough; ^l Lambay.

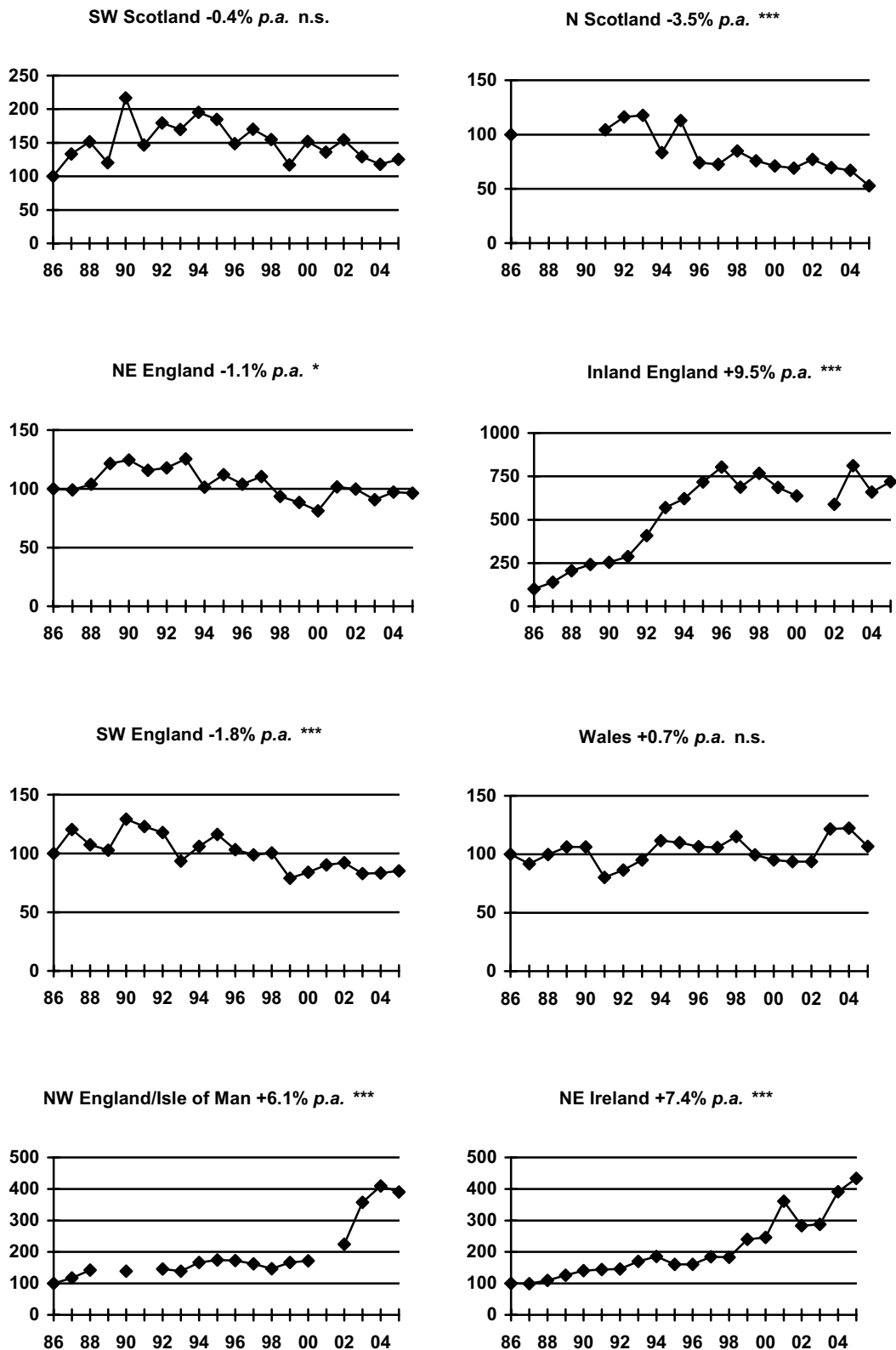


Figure 3.7.1 Regional population indices for breeding great cormorant, 1986-2005 (apparently occupied nests in late May or June). Average annual rates of change were calculated by regression of natural log of index against year (see section 1.2.2. for details). Significance of trends indicated as: n.s. not significant, * $P < 0.05$, *** $P < 0.001$.

In some other western regions of the UK numbers recorded in 2005 were similar to 2004. In **north-west England/Isle of Man**, changes at individual colonies were proportionally small, except at Wood's Strand, which held the fewest pairs. Sample colonies in **south-west England**, where no substantial change was apparent overall, are also small, but resulted in some large proportional changes. In **Wales**, overall numbers decreased by 12% between 2004 and 2005, but the long-term trend was rather stable. Decreases were apparent on St. Margaret's Island, Ynysydd Gwylan and, especially, on Ynys yr Adar, which held 86 AON in 2004 but was deserted in 2005. Gwynedd 'A' was also found to be deserted in 2005 (previous count 76 pairs in 2003). An increase was recorded at Great Ormes Head, and numbers also rose at nearby Little Ormes Head, one of the largest colonies in the UK, although the increase there was proportionally fairly small.

In **north-east Ireland**, numbers at Strangford Lough reached a new peak, continuing the long-term increase recorded at the site; 490 AON was the count in 2005, almost quadruple the number recorded there in 1986 (125 AON). In contrast, the long-term trend on Lambay (**south-east Ireland**), where a 30% decrease was noted since 2004, is downward and numbers in 2005 (352 AON) were about one-third of that recorded in 1991 (1,045 AON).

A moderate decrease was recorded in **north Scotland**, where six sites were deserted in the last decade, although two new ones have been formed. All colonies visited declined between 2004 and 2005, and numbers were generally the lowest on record at each site, excluding Cnoc na Stri (colonised in 2003), where numbers continued to increase, rising by 21%. For the first time, no birds were recorded nesting at Stacks of Occumster and Neuk Mhor (a sub-colony of the Ord of Caithness) (Sellers 2005). In **south-east Scotland**, a larger decrease, of 34%, was recorded. Again decreases were noted at all colonies where comparable figures for 2004 and 2005 were available, except at Fast Castle where numbers were stable. The colony on Carr Craig in 2004 apparently moved to Haystack in 2005. The number nesting at Sands of Forvie (**north-east Scotland**) more than doubled between 2004 and 2005; the colony has increased each year since cormorants were first recorded there in 2001. The decreases noted above were very likely linked to the wreck of shags and cormorants reported in late winter/early spring of 2005; higher than usual numbers of both these species were reported from eastern coasts during the annual beached birds survey (Schmitt 2005).

No other eastern regions showed notable changes between 2004 and 2005. Numbers in **north-east, south-east and inland England** were relatively stable between these years (Sellers 2005). Changes at individual colonies were generally unremarkable, with increases of *c.* 10% recorded at Dungeness and the smaller colonies at Saltburn and Boulby, although numbers at Aldermaston increased by 73%. At the largest colony in each region - the Farne Islands, Rutland Water and Rye Harbour, respectively - totals in 2005 were similar to those in 2004. Elsewhere, the number nesting at Marsden (also north-east England), fell by 56% since 1999, to 108 AON.

Few data were received from colonies in the Northern Isles; numbers in the small colony at Grocken (**Shetland**) increased from 11 to 15 AON and 155 AON were counted on Boray Holm (**Orkney**) in early September. At the latter site, although the count date makes comparison with previous data difficult there does not appear to be any noticeable trend in recent years.

Table 3.7.2 Population changes of great cormorant 2004-2005 and 1986-2004 at selected sites referred to in the text.

Region/Site	2004	2005	2004-2005 % change	1986-2004	
				Mean (\pm s.d.)	No. of years
SW Scotland					
Lady Isle	54	101	+87.0	114 (52)	6
Port o' Warren	153	116	-24.2	152 (38)	13
Sanda	17	19	+11.8	24 (6)	17
Ruadh Sgeir	15	17	+13.3	18 (6)	5
Eilean Dubh	15	19	+26.7	8 (5)	8
NW Scotland					
An Glas Eilean	26	32	+23.0	39 (4)	11
Loch an Tomain	34	51	+50.0	44 (8)	5
N Scotland					
Stacks of Occumster	22	0	-100.0	19 (11)	13
Traighe Bhuidhe	25	21	-16.0	17 (15)	3
Ord of Caithness	20	15	-25.0	75 (35)	14
Cnoc na Stri	34	41	+20.6	20 (18)	3
North Sutor	178	143	-19.7	218 (36)	14
NE Scotland					
Sands of Forvie	36	81	+125.0	19 (13)	4
SE Scotland					
Inchkeith	137	85	-38.0	111 (24)	4
Carr Craig/ Haystack	82/0	0/51	-37.8	109 (58)	18
The Lamb	96	55	-42.7	119 (42)	18
Fast Castle	48	48	0.0	42 (10)	12
NE England					
Farne Islands	187	185	-1.1	221 (43)	19
Saltburn	26	29	+11.5	40 (11)	18
Boulby	43	48	+11.6	23 (15)	12
Inland England					
Rutland Water	128	123	-3.9	55 (49)	11
Aldermaston	26	45	+73.1	21 (11)	7
SE England					
Dungeness	107	118	+10.3	72 (34)	8
Rye Harbour	132	134	+1.5	83 (52)	5
SW England					
Gad Cliff	43	32	-25.6	73 (27)	17
White Nothe	23	29	+26.1	28 (8)	5
Ballard Cliff	85	69	-18.8	104 (30)	15
Carsewell Cove	14	26	+85.7	20 (7)	13
Thatcher's Rock	20	38	+90.0	36 (13)	10
Wales					
Penderi	36	31	-14.9	100 (52)	9
St Margaret's Island	189	147	-22.2	207 (50)	19
Ynsoedd Gwylan	63	47	-34.0	68 (16)	14
Ynys yr Adar	86	0	-100.0	57 (46)	12
Great Ormes Head	25	43	+72.0	43 (19)	14
Little Ormes Head	403	429	+6.5	296 (83)	15
NW England/Isle of Man					
South Solway	63	56	-11.1	36 (28)	3
St. Bee's Head	86	90	+4.7	25 (29)	12
Grune Point	64	63	-1.6	56 (11)	14
Wood's Strand	37	31	-16.2	37 (0)	2
NE Ireland					
Strangford Lough	442	490	+10.9	228 (91)	19
SE Ireland					
Lambay	501	352	-29.7	661 (229)	5

Breeding success (Table 3.7.3)

Mean productivity in 2005 was 1.36 chicks per AON (s.e. ± 0.30) from seven colonies. When compared with the long-term mean of 1.96 (s.e. ± 0.06) chicks per AON, recorded from between three and 15 colonies annually, this suggests that it was a less than successful breeding season.

At North Sutor (**north Scotland**), the only eastern site for which data were available, productivity was below the colony average and the lowest value recorded at this usually successful colony since 1997. A high percentage (40%) of nests failed, with poor weather, apparently low food availability and depredation by gulls cited as contributory factors.

On Lady Isle (**south-west Scotland**), breeding success in 2005, at 1.08 chicks per AON, was low by national standards, but relatively successful for the site, where the average is 0.54 chicks per AON. In other western regions, productivity was not only lower at all colonies than in 2004 (excluding Will's Strand, **Isle of Man**, where it was equal to 2004) but also lower than the respective colony means. Complete failure was recorded at South Solway 'B' (**north-west England**), where the eggs of all nests and subsequent relays were systematically smashed (M. Carrier, pers. comm.). In **Wales**, breeding success in 2005 was the second lowest on record on Skomer and on Bardsey (but still high at the latter colony in a national context), although few years of data are available for comparison. A similar scenario was recorded at Ballard (**south-west England**).

Table 3.7.3 Breeding success (chicks fledged per occupied nest) of great cormorant 2004 and 2005 and 1986-2004 at selected sites referred to in the text. Figures in parentheses under 2004 and 2005 are the number of nests from which success estimate was derived.

Region/site	2004	2005	1986-2004	
			Mean (\pm s.e.)	No. of years
SW Scotland				
Lady Isle	0.41 (54)	1.08 (101)	0.54 (0.29)	3
N Scotland				
North Sutor	1.89 (118)	1.33 (53)	2.07 (± 0.12)	13
SW England				
Ballard Cliff	1.67 (57)	1.22 (40)	1.37 (± 0.11)	4
Wales				
Ynsoedd Gwylan	3.66 (63)	2.21 (39)	3.12 (± 0.34)	5
Skomer	1.50 (6)	1.27 (11)	1.67 (± 0.34)	5
NW England/Isle of Man				
South Solway 'B'	1.19 (63)	0.00 (56)	1.45 (± 0.28)	3
Will's Strand	2.40 (35)	2.41 (29)	2.49 (± 0.05)	6

3.8 European shag *Phalacrocorax aristotelis*

Large decreases were noted in NW, N and SE Scotland and NE England between 2004 and 2005, linked to a major seabird wreck reported in late winter/early spring of 2005. The annual beached bird survey found that the number of dead shags in these regions were the highest since 1994. In contrast, numbers increased in Wales. Overall breeding success was similar to 2004 and thus well below the long-term British and Irish mean. Success in Shetland and N and SE Scotland was particularly low, perhaps in part due to birds failing to attain adequate breeding condition.

Breeding numbers (Tables 3.8.1 and 3.8.2, Figure 3.8.1)

Low breeding numbers of European shags were recorded in several regions in 2005, particularly those on the east coast of the UK. In **north Scotland**, numbers in the single colony monitored, at North Sutor, fell by 42% to 260 AON. A 54% reduction in numbers was observed in **south-east Scotland**. Considering only colonies holding more than ten pairs, decreases noted between 2004 and 2005 were high, usually in the range 55-65%, except at Inchmickery, where a decline of 33% was recorded, and at Inchkeith, where numbers were remarkably stable. Adjacent to this region, numbers were also lower on the Farne Islands (**north-east England**), having decreased by 34% since 2004. In each of these regions the trend in recent years has generally been of a recovery, following a major ‘wreck’ in 1994, which dramatically reduced breeding numbers. Another ‘wreck’ occurred in late winter/early spring of 2005, after which the number of dead shags found on beached bird surveys was the highest since 1994 (Schmitt 2005). Over two-thirds of these birds were recorded on beaches in the east of Scotland and north-east England, with a further 20% found in western Scotland (Schmitt 2005). During the wreck, 146 shags previously ringed on the Isle of May, many of breeding age, were reported dead. Presumably, many of those that survived were in too poor condition to successfully breed. Unsurprisingly, the return rate of birds to the Isle of May was very low (36%), second only to that of 1994, when 13% returned (long-term average =81%) (Harris *et al.* 2005). Elsewhere on the east coast, four small colonies visited in **north-east Scotland** suggested that numbers increased compared with 2004; 74 AON were present compared with 65 in 2004, although there was little change noted in the largest colony, at Portknockie.

Table 3.8.1 Regional population changes at monitored European shag colonies, 2004-2005 (apparently occupied nests in May-June). Counts with a reported inaccuracy of > ±5%, and regional samples < 100 AON, are excluded. Trends for 1986-2004 are average annual rates of change shown by sample populations. Significance of trends indicated as: n.s. not significant, ** P < 0.01, *** P < 0.001). Further details of calculation of trends are given in section 1.2.2.

Region	2004	2005	2004-2005 % change	% annual change
SW Scotland ^a	1,764	1,736	-1.6	+3.4 ** 1994-2004
NW Scotland ^b	579	380	-34.4	-4.6*** 1987-2004
Shetland ^c	486	456	-6.2	-3.3*** 1986-2004
N Scotland ^d	447	260	-41.8	-
SE Scotland ^e	2,059	956	-53.6	-4.9** 1986-2004
NE England ^f	1,410	937	-33.5	-0.6 n.s. 1994-2004
Wales ^g	197	245	+24.4	-

Colonies: ^a Mull of Galloway, Lady Isle, Sanda Island, Colonsay (sample plots), Ceann a Mhara, Lunga, Coll, Eilean Dubh, Carraig an Daimh, Glas Eilean, Ruadh Sgeir, Eilean na Cille; ^b Handa (plot), Eigg, Canna; ^c Fair Isle (plots), Noss, Sumburgh Head, Noness; ^d North Sutor; ^e Isle of May, Inchkeith, Fidra, Inchmickery, Inchcolm, Haystack, Carr Craig, Craigleith, The Lamb, Bass Rock, St. Abb's Head; ^f Farne Islands; ^g Caldey, Barafundle to Giltar, Stackpole Head, Elegug Stacks and nearby, Skomer, Middleholm, St Margaret's Island, Bardsey, Ynysoedd Gwylan, Little Ormes Head.

In **north-west Scotland**, numbers were 35% lower than in 2004, with notable decreases recorded in the large colony on Canna and the smaller one on Eigg. As stated above, there is evidence that breeding numbers were affected by the ‘wreck’ early in 2005. However, the regional trend indicates that a decline was apparent for several years prior to this event. The overall number in **south-west Scotland** appeared to be stable, although changes noted at individual colonies were vary variable. Moderate to large increases were noted at Ceann a Mhara, Coll, Carraig an Daimh and, particularly, on Lady Isle, where the number of nests quadrupled. Numbers decreased at Eilean na Cille, Eilean Dubh, Ruadh Sgeir, Lunga and Mull of Galloway, but no change was observed on Sanda.

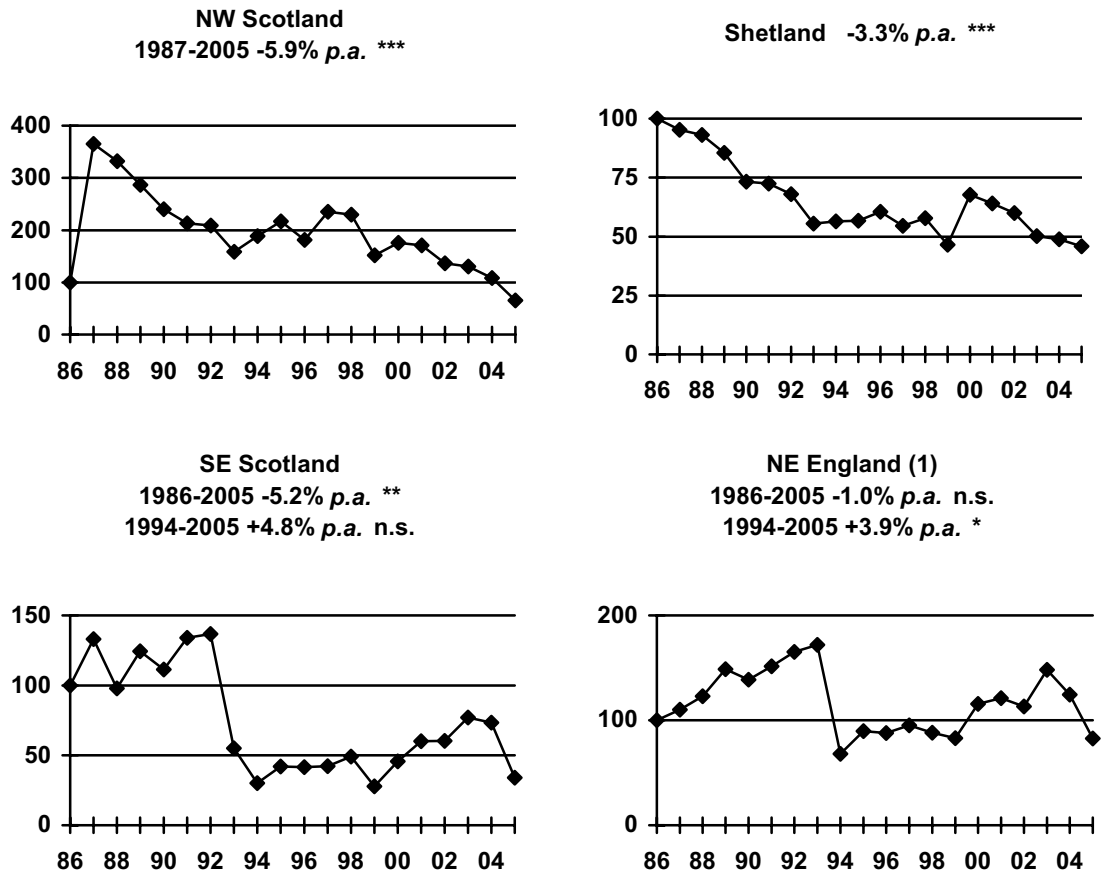


Figure 3.8.1 Population indices for breeding European shags, 1986-2005 (apparently occupied nests in late May or June). Average annual rates of change were calculated by regression of natural log of index against year (see section 1.2.2. for details). Trends are shown for the periods indicated. Three or more colonies are counted in each region in each year unless otherwise indicated. Note: the large increase in index value between 1986-87 for north-west Scotland is due to many European shags on Canna not nesting in 1986. Statistical significance of trends indicated as: n.s. not significant, * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

In **Shetland**, monitoring in 2005 was largely restricted to the coasts of south-east Mainland (Heubeck 2005). At those colonies counted in 2004 and 2005 numbers were relatively stable overall, although decreases were noted at Sumburgh Head and in plots on Fair Isle. An increase on Noss resulted in the highest count at the island in a decade but there was little change at Noness. A larger set of data from nine sites, comparable with counts in 2003, also showed that numbers had changed little over that period (740 AON in 2003 vs. 747). However, on Foula, once the largest colony in the north-east Atlantic, numbers remained low after the decline reported in 2004; a count of the Mucklebriuk sub-colony in mid-June recorded just 18 nests in an area which held 1,009 nests in 2000 (Gear 2005). The number of shags (of all ages) estimated around the island in mid-July, on land or close inshore, was just a small proportion of what would usually have been present, indicating further decline from 2004; 244 birds were found, only one of which was a chick (468 birds from a comparable count in 2004). At this time of year the colony would normally hold over 2,000 breeding pairs (Mitchell *et al.* 2004) plus

associated non-breeders and immatures. Limited data from **Orkney** suggested that numbers were lower than in 2004, particularly on Swona, although on Auskerry there appeared to be little change.

Table 3.8.2 Population changes of European shag 2004-2005 and 1986-2004 at selected colonies mentioned in the text. All counts refer to whole colony unless stated.

Region/Site	2004	2005	2004-2005 % change	1986-2004	
				Mean (\pm s.d.)	No. of years
SW Scotland					
Lady Isle	57	221	+287.7	54 (13)	4
Lunga	340	184	-46.2	231 (86)	12
Mull of Galloway	102	51	-50.0	50 (19)	16
Ceann a Mhara	97	112	+15.5	117 (33)	3
Ruadh Sgeir	79	62	-21.5	91 (19)	11
Sanda	800	800	0.0	648 (167)	17
Eilean Dubh	65	22	-66.2	61 (13)	6
Carraig an Daimh	25	47	+88.0	26 (16)	11
Eilean na Cille	44	37	-15.9	19 (10)	13
Coll	115	157	+36.5	54 (42)	7
NW Scotland					
Canna	495	327	-33.9	919 (303)	19
Eigg	57	37	-35.1	60 (35)	18
Shetland					
Sumburgh Head	183	153	-16.4	263 (107)	18
Noss	74	89	+20.3	76 (16)	19
Noness	107	117	+9.3	116 (18)	16
Fair Isle (plots)	122	97	-20.5	173 (43)	19
Orkney					
Auskerry	40	44	+10.0	26 (8)	6
Swona	42	28	-33.3	42 (-)	1
N Scotland					
North Sutor	447	260	-41.8	280 (90)	11
NE Scotland					
Portknockie	47	49	+4.3	16 (16)	18
SE Scotland					
Isle of May	687	281	-59.1	939 (504)	19
Inchkeith	153	161	+5.2	43 (45)	18
Inchmickery	78	52	-33.3	34 (19)	15
Fidra	272	115	-57.7	132 (72)	19
Craigleith	324	131	-59.6	320 (184)	18
The Lamb	111	49	-55.9	136 (99)	15
Bass Rock	46	18	-60.9	41 (30)	10
St. Abb's Head	369	131	-64.5	292 (104)	19
NE England					
Farne Islands	1,410	937	-33.5	1,337 (337)	19
Wales					
Middleholm	49	39	-20.4	33 (9)	9
Bardsey	36	42	+16.7	30 (17)	19
Ynysoedd Gwylan	84	131	+56.0	99 (29)	8
SW England					
St Aldhelm's – Durlston Head	52	63	+21.2	52 (7)	10

In contrast to eastern regions and north-west Scotland, numbers in **Wales** increased by 24% in 2005 although the majority of colonies monitored in the region contain fewer than 10 pairs. Numbers in the largest colony, on Ynysoedd Gwylan, increased by 56% to 131 AON, with a 17% increase noted on nearby Bardsey. Prior to 2005, both colonies had recorded declining numbers since 2001 and 2002, respectively. On Middleholm, numbers fell by 20%, although the figure for 2005 was still the second highest on record for the site after the peak count in 2004. An increase was noted in **south-west England**, where numbers between St. Aldhelm's Head and Durlston - the largest colony monitored in the region - increased by 20%. Elsewhere, numbers at the Calf of Man (**north-west England/Isle of Man**) declined by 36% since 2002, from 205 to 132 AON.

Breeding success (Tables 3.8.3 and 3.8.4)

For 15 colonies where detailed monitoring was undertaken in 2005, mean breeding success was 1.10 (s.e. ± 0.21) chicks per AON, below the long-term mean of 1.30 (s.e. ± 0.04) recorded from between three and 20 colonies sampled during 1986-2004. A comparison of 14 colonies sampled in both 2004 and 2005 revealed that productivity in both years was similar.

Table 3.8.3 European shag breeding success, grouped regionally 2004-2005: estimated number of chicks fledged per occupied nest at sample colonies (superscript n = number of colonies). Figures are based on nests where eggs or apparent incubation were recorded, and are presented as the mean and standard error of figures for individual colonies. Only colonies where ten or more nests were monitored are included. The figures used for some colonies in both years in south-west Scotland as well as for An Glas Eilean in north-west Scotland are based on just one or a few visits and are therefore approximate; those for other colonies and regions are based on regular checks of sample nests. Changes in breeding success are indicated for colonies studied in both years, none of which were statistically significant.

Regions	2004 chicks fledged/nest				2005 chicks fledged/nest				2004-2005 change	
	Nests ⁿ	Range	Mean	+s.e.	Nests ⁿ	Range	Mean	+s.e.	Mean ⁿ	+s.e.
SW Scotland ^a	274 ⁴	1.08-1.77	1.42	± 0.14	586 ⁶	0.59-2.02	1.21	± 0.21	-0.05 ⁴	± 0.29
NW Scotland ^b	219 ²	0.73-1.80	1.26	± 0.54	440 ³	0.61-1.72	1.04	± 0.35	-0.76 ²	± 0.43
Shetland ^c	196 ³	0.00-0.75	0.45	± 0.23	174 ³	0.00-0.84	0.50	± 0.26	+0.05 ³	± 0.07
N Scotland ^d	98 ¹	-	0.93	-	41 ¹	-	0.17	-	-0.76 ¹	-
SE Scotland ^e	203 ²	0.28-0.30	0.29	± 0.01	71 ²	0.29-0.42	0.36	± 0.07	+0.07 ²	± 0.07
NE England ^f	271 ¹	-	0.27	-	264 ¹	-	0.86	-	+0.59 ¹	-
Wales ^g	120 ²	2.19-2.92	2.55	± 0.36	212 ³	2.17-2.59	2.35	± 0.12	-0.18 ²	± 0.16
Total	1,381 ¹⁵	0.00-2.92	1.11	± 0.21	1,788 ¹⁹	0.00-2.59	1.09	± 0.17	-0.13¹⁵	± 0.13
Detailed only	1,363 ¹⁴	0.00-2.92	1.09	± 0.23	1,568 ¹⁵	0.00-2.59	1.10	± 0.21	-0.08¹⁴	± 0.12

Colonies: ^a Ruadh Sgeir (2005 only), Eilean Aoghainn, Eilean na Cille (2005 only), Coll, Sanda, Lady Isle; ^b Canna, Rum, An Glas Eilean (2005 only); ^c Sumburgh Head, Fair Isle, Foula; ^d North Sutor; ^e Isle of May, St. Abb's Head; ^f Farne Islands; ^g Bardsey, Ynysoedd Gwylan, Middleholm (2005 only).

As was the case in 2004, eastern regions of the UK were less successful than western regions. Overall breeding success in **Shetland**, **north** and **south-east Scotland** and **north-east England** was low. Breeding success was below the long-term average at each colony monitored in these regions, and was also the lowest on record on Foula (equal with 2004), Fair Isle, North Sutor and St. Abb's Head. Some aspects of the breeding season were shared by several colonies. The number of nests in study plots were lower than normal, especially at North Sutor, Isle of May and St. Abb's Head, where plots held 60-70% fewer nests than in 2004. Detailed studies revealed it was a late breeding season at Sumburgh Head, where only 60% of pairs that would lay eggs had done so by 30 May (Heubeck 2005) and on the Isle of May, where the first egg was laid on 6 May (*cf.* 17 April in 2004 and 1986-2003 mean of 10 April) (Harris *et al.* 2005). At North Sutor, it was considered that the late winter wreck left many adults in poor physical condition as a high proportion of nests failed shortly after egg laying (Swann 2005b) but presumed food availability problems during the summer also contributed to the low success there and at other colonies. For example, on Fair Isle, ringing visits found many dead

chicks in the colony, although none were seen at Sumburgh Head, and repeat measurements of live chicks found that they did not gain weight as quickly as they usually would have (Shaw *et al.* 2005). Diet studies on the Isle of May found that sandeels, normally the most important prey species, contributed just 41% of the biomass of fish fed to chicks, the remainder primarily consisting of gadoids and clupeids. Furthermore, all but three of 629 sandeels in the samples were 0-group; normally, older (1+) sandeels make up most of the diet at this site. Depredation by large gulls reduced success on the Farne Islands, particularly on the Inner Group (Walton *et al.* 2005).

In **north-west** and **south-west Scotland**, overall success was higher than on the east coast; however, fledging success was below the long-term mean at most sites. All colonies in the north-west also were less successful than in 2004, while in the south-west productivity was generally above, or equal to 2004, except at Eilean Aoghainn. On Canna, mild late-winter weather may have been a factor that led to shags laying earlier than normal. Breeding success was very variable between sub-colonies of Canna, being highest on the rat free cliffs on Sanday (1.29), lowest at Nunnery (0.17), where common ravens *Corvus corax* depredated many nests on open cliff sites, and moderate in the boulder colonies of Lamasgor (1.12) and Geugasgor (0.56), which suffered differing levels of rat depredation, the latter site also experiencing depredation by large gulls (Swann 2005a).

Table 3.8.4. Breeding success (chicks fledged per occupied nest) of European shag 2004 and 2005 and 1986-2004 at selected colonies mentioned in the text. Figures in parentheses under 2004 and 2005 are the number of nests from which the success estimate was derived.

Region/site	2004	2005	1986-2004	
			Mean (\pm s.e.)	No. of years
SW Scotland				
Lady Isle	1.77 (57)	2.02 (221)	1.29 (0.23)	4
Sanda	1.32 (84)	1.33 (88)	1.68 (0.22)	4
Coll	1.08 (115)	1.50 (157)	1.08 (-)	1
Ruadh Sgeir	-	c.0.85 (62)	c.1.05 (0.16)	11
Eilean na Cille	-	c.0.97 (36)	c.1.72 (0.13)	11
Eilean Aoghainn	c.1.49 (18)	c.0.59 (22)	c.1.43 (0.28)	4
NW Scotland				
Rum	1.80 (104)	0.61 (66)	1.28 (0.26)	3
Canna	1.11 (111)	0.78 (274)	1.14 (0.13)	19
An Glas Eilean	-	c.1.72 (100)	c.0.94 (0.20)	10
Shetland				
Sumburgh Head	0.66 (135)	0.84 (118)	1.19 (0.07)	17
Fair Isle	0.69 (53)	0.66 (47)	1.41 (0.07)	19
Foula	0.00 (8)	0.00 (9)	0.78 (0.20)	8
N Scotland				
North Sutor	0.93 (98)	0.17 (41)	1.45 (0.10)	13
SE Scotland				
Isle of May	0.28 (103)	0.42 (42)	0.93 (0.11)	19
St. Abb's Head	0.30 (100)	0.29 (29)	1.28 (0.13)	15
NE England				
Farne Islands	0.27 (271)	0.86 (264)	0.95 (0.10)	16
Wales				
Bardsey	2.92 (36)	2.59 (42)	2.17 (0.13)	11
Ynysodd Gwylan	2.19 (84)	2.17 (131)	2.00 (0.08)	6
Middleholm	-	2.30 (39)	2.04 (0.22)	3

Colonies in **Wales** were again the most successful in the UK, fledging over two chicks per AON, with above average success noted at all three sample colonies. Birds on Bardsey were particularly successful, with some nests fledging broods of five. Clutch size has been remarkably stable at the site in recent years, at 5.55 eggs per nest in 2005, 5.53 in 2004 and 5.54 in 2003 (Stansfield 2005).

3.9 Arctic skua *Stercorarius parasiticus*

Between 2004 and 2005 numbers of apparently occupied territories (AOT) at sampled sites increased overall by more than a third, after 12 years of decline, but remained at a very low level. Declines of 30% and more in north-west Scotland and Orkney were offset by marked increases in Shetland. Arctic skuas were generally more productive in Shetland and Orkney than in 2004, although sandeels were still apparently scarce.

Breeding numbers (Tables 3.9.1 and 3.9.2)

In **Shetland**, numbers of AOT recovered to 2003 levels following a 50% decline between 2003 and 2004. This was largely due to substantial increases on Fair Isle and Foula. On Fair Isle, numbers of AOT in 2005 more than doubled compared with 2004, and pairs on over 90% of AOT attempted to breed (Shaw *et al.* 2005). On Foula, only 18 of the pairs on 68 AOT actually nested, compared with 48 in 2003. In years of extreme food shortages in the pre-breeding period, birds may not establish territories and thus would not be recorded; this can explain the large fluctuations in numbers of AOT between years. Numbers increased at Mousa to 12 AOT, the highest level since 2001, though still below the colony average. A small increase from three to five AOT was noted at Noss, whilst no change occurred at three study plots on Fetlar (9 AOT). Hermaness was the only colony to decrease from 2004, by one AOT. An additional 10 sites were surveyed as part of a study into the decline of Arctic skuas and all but the Noss Hill (south Mainland) study plot held Arctic skua AOT, the largest being on Papa Stour with 29 AOT.

Table 3.9.1 Regional population changes at monitored Arctic skua colonies, 2004-2005 (apparently occupied territories). Superscript = number of colonies counted in both years. Note that British totals are for the sample of monitored colonies in that year only and not the entire population.

Region	2004	2005	2004-2005 % change
Shetland	≥73	201	+<175.3 ⁷
Orkney	67	43	-35.8 ⁴
NW Scotland	30	21	-30.0 ¹
Britain	170	265	+55.9 ¹²

In **Orkney**, a substantial decline, of over 30%, of AOT at sample sites between 2004 and 2005 was largely due to numbers at North Hill, Papa Westray falling to record low levels. Anecdotal evidence suggested that numbers have sharply decreased throughout Orkney (Meek 2005).

The Arctic skua population on Handa (**north-west Scotland**) continued its decline since 2001 to its lowest level in 20 years. Of the 21 AOT recorded, 17 pairs nested. Elsewhere in the region one pair was recorded at Haskeir Island (*cf.* none in 2002 and 1987) and one to two individuals were present on North Rona. Numbers on Coll (**south-west Scotland**) remained stable, at 12 AOT.

Table 3.9.2 Population (apparently occupied territories) changes of Arctic skua 2004–2005 and 1986–2004 at selected sites referred to in the text.

Region/Site	2004	2005	2004-2005 % change	1986-2004	
				Mean (\pm s.d.)	No. of years
Shetland					
Hermaness (Unst)	8	7	-12.5	12 (3)	13
Fetlar	9	9	0.0	18 (5)	15
Noss	3	5	+66.6	13 (5)	19
Mousa	7	12	+71.4	17 (6)	15
Fair Isle	33	71	+115.2	83 (22)	18
Foula	>13	68	+<423.1	113 (34)	16
Orkney					
North Hill, Papa Westray	58	37	-36.2	113 (37)	16
NW Scotland					
Handa	30	21	-30.0	31 (6)	19

Breeding success (Tables 3.9.3 and 3.9.4)

Following complete breeding failure in **Shetland** in 2004, attributed to low sandeel availability, food appeared to be again scarce in 2005, but seemingly enough for an increased number of pairs to attempt breeding. It was, however, an overall poor breeding season, with few young fledged. Nesting generally started late (Shaw *et al.* 2005; Devine and Smith 2005; Okill 2005b) and hatching success was particularly low on Foula, where just two chicks hatched from 18 nests and only one survived to fledging. On Fair Isle, depredation by great skuas and low food availability resulted in only five young fledging from 71 AOT (Shaw *et al.* 2005). However, few sites reported complete breeding failure. On Fetlar, nine pairs nesting in three study plots produced no fledged young for a third consecutive year and an additional survey carried out between Vord Hill and Cruss also found no fledged young in 31 AOT. Six chicks fledged at Mousa resulting in productivity of 0.5 young per pair, just above average for the site. The additional Arctic skua study plots in the north and west of Shetland were less productive than those in the south and east, and complete breeding failure was recorded at Black Park (2 AOT) and Lumbister (7 AOT) on Yell, and on Papa Stour. Single chicks fledged at Colvadale, Unst (20 AOT), Mioness (6 AOT) and Tingon in North Mainland (12 AOT), whereas productivity was 0.5 chicks per AOT at Culswick (8 AOT), 0.8 at Dalsetter (4 AOT) and 0.4 at Kettlaness (8 AOT), South Mainland. One chick fledged from one AOT at Noness, South Mainland.

Arctic skuas on **Orkney** were only marginally more productive than those in Shetland. Nesting also started late and food availability appeared to be low (Meek 2005). At the Hoy reserve three young fledged from 4 AOT (*cf.* 2 from 6 AOT in 2004). Study plots were surveyed as part of the Arctic skua project, including part of the North Hill colony at Papa Westray. Productivity for the whole colony was 0.30 chicks per AOT, much higher than in 2004 but still less than half the colony average. On the study plot, however, productivity was only 0.15 chicks per AOT (26 AOT). Productivity at two plots on Eday and Rousay was 0.4 and 0.3 chicks per AOT (8 and 9 AOT, respectively). The Binga Fea study plot at Hoy held only a single bird, and those on the study plot on Lushan, Mainland, and on Flotta, did not attempt to breed.

On Handa (**north-west Scotland**), hatching success was 30% lower than in the previous two years, due to egg predation by an unspecified predator. Additionally, an increase in chick predation by great skuas before fledging reduced productivity to 0.6 chicks (*cf.* 1.32 in 2004 and 1.22 in 2003).

Post-fledging mortality, however, was lower than in 2003, although still around 40%. This was probably due to fewer great skuas being on territory during the main Arctic skua fledging period in 2005. The regular occurrence in 2005 of Arctic skuas hunting over moorland seemed indicative of less food obtainable through kleptoparasitism (Smith and Jones 2005). On Coll (**south-west Scotland**), Arctic skuas were more successful: 10 young fledged from 12 AOT.

Table 3.9.3 Arctic skua breeding success grouped regionally, 2004–2005: estimated number of chicks fledged per apparently occupied territory at sample colonies (superscript n = number of colonies). Note that the same colonies have not necessarily been monitored in each region each year and that the number of pairs given here are sample sizes (and do not necessarily indicate population changes between years).

Region	2004 chicks fledged/AOT			2005 chicks fledged/AOT		
	AOT ⁿ	Range	Overall	AOT ⁿ	Range	Overall
Shetland	≥73 ⁶	0.00	0.00	300 ¹⁷	0.00-1.00	0.10
Orkney	67 ⁴	0.00-0.33	0.09	70 ⁸	0.00-1.00	0.30

Table 3.9.4 Breeding success (chick fledged per apparently occupied territory) of Arctic skua 2004–2005 and 1986–2004 at selected sites referred to in the text.

Region/site	2004	2005	1986–2004	
			Mean (±s.e.)	No. of years
Shetland				
Hermaness (Unst)	0.0	0.14	0.53 (0.11)	14
Fetlar	0.0	0.0	0.41 (0.12)	18
Noss	0.0	0.40	0.42 (0.08)	19
Mousa	0.0	0.50	0.47 (0.13)	15
Fair Isle	0.0	0.07	0.55 (0.11)	17
Foula	0.0	0.01	0.53 (0.12)	14
Orkney				
North Hill, Papa Westray	0.07	0.30	0.64 (0.10)	15

3.10 Great skua *Stercorarius skua*

Several Shetland sites reported increases in numbers of apparently occupied territories (AOT) from 2004, although many of the birds holding territory did not nest. Numbers declined in Orkney at sample sites but remained stable in NW Scotland. Breeding started late, but great skuas were overall more productive than in 2004, with the exception of NW Scotland, where productivity was very low.

Breeding numbers (Tables 3.10.1 and 3.10.2)

At most sites in **Shetland** numbers remained stable or increased, resulting in 26% more AOT than in 2004. Fetlar and Noss noted record high levels of AOT while on Fair Isle, the count was the third highest ever. However, only 56% of those birds occupying territories on Fair Isle laid eggs (Shaw *et al.* 2005). Breeding in Shetland started late and birds were reported to be unusually passive in defending their territories (Devine and Smith 2005; Sykes and Bliss 2005). Elsewhere on Shetland, counts made on study plots revealed 31 AOT at Lumbister, 19 at Noness, 7 at Tingon and 24 at Colvadale (N. Ratcliffe, pers. comm.).

Table 3.10.1 Regional population changes at monitored great skua colonies, 2004–2005 (apparently occupied territories). Superscript = number of colonies counted in both years.

Region	2004	2005	2004-2005 % change
Shetland	274	345	+25.9 ⁵
Orkney	62	54	-12.9 ⁴
North-west Scotland	214	219	+2.3 ⁴

In **Orkney**, 13% fewer AOT were recorded than in 2004. The largest decline, of 16%, occurred at Stourdale (Hoy), whilst at North Hill on Papa Westray one pair fewer nested than in 2004. At Birsay Moors, 25 AOT were found, compared with 30 in 2003.

On Handa (**north-west Scotland**), the second highest number of AOT was recorded since 1986, an increase of five AOT from 2004. On Canna and Priest Island, numbers remained stable at two and four AOT respectively. Two AOT were counted on Haskeir Island (*cf.* 1 in 2002), and 17 on North Rona (*cf.* 19 in 2000). Numbers on Coll (**south-west Scotland**) declined to 7 AOT compared with 11 in 2004.

Table 3.10.2 Population (apparently occupied territories) changes of great skuas 2004–2005 and 1986–2004 at selected sites referred to in the text.

Region/Site	2004	2005	2004-2005 % change	1986-2004	
				Mean (\pm s.d.)	No. of years
Shetland					
Hermaness (Unst)	38	39	+2.6	43 (16)	16
Fetlar	68	72	+5.9	61 (7)	10
Noss	52	66	+26.9	51 (12)	17
Mousa	20	24	+20.0	16 (5)	11
Fair Isle	96	144	+50.0	109 (28)	18
Orkney					
North Hill, Papa Westray	15	14	-6.7	11 (2)	8
Stourdale, Hoy	45	38	-15.6	47 (13)	19
NW Scotland					
Handa	207	212	+2.4	128 (59)	17

Breeding success (Tables 3.10.3 and 3.10.4)

Although overall breeding success in **Shetland** remained low, almost all sites reported increased productivity compared with 2004. Fetlar and Hermaness recorded moderate productivities, of over 0.5 chicks per AOT, and on Foula, seven young fledged from a sample of 22 AOT. At other sites, such as Mousa and Noss, breeding success was only marginally higher than in 2004, and on Fair Isle, just one young fledged from 144 AOT, the lowest recorded productivity for this site (Shaw *et al.* 2005). High levels of conspecific depredation, as a possible result of very low food availability, was probably the main cause for the low breeding success on Fair Isle (Shaw *et al.* 2005).

Breeding was also delayed in **Orkney**, where great skuas were slightly more productive than in 2004. At Stourdale (Hoy) about a third of the territories were deserted early, and of the remainder most nests contained only one chick (Meek 2005). However, it was thought that all of these survived to fledging, resulting in double the productivity of 2004 (Meek 2005). At the North Hill colony on Papa Westray, breeding success was also much higher than in 2004: eight young fledged from 14 AOT. For the first

time, great skuas bred successfully on North Ronaldsay, with a single pair rearing two young. In contrast, no chicks fledged at four study plots on Stronsay, South Hoy, Mainland Orkney and Eday with between three and five AOT.

On Handa (**north-west Scotland**), adling and predation of eggs combined with high levels of chick losses resulted in very low productivity - 0.07 chicks per breeding pair. Analysis of pellets revealed that the diet of breeding great skuas comprised 50% fish and 43% birds such as auks and gulls. The most dominant fish species were whiting *Merlangius merlangus* and Norway pout *Trisopterus esmarkii*, common fisheries discards, and only 5% sandeel (Smith and Jones 2005). One young fledged from two AOT on Canna. On Coll (**south-west Scotland**), productivity was considerably higher than in 2004, at 0.43 young per AOT.

Table 3.10.3 Great skua breeding success, grouped regionally 2004–2005: estimated number of chicks fledged per apparently occupied territory at sample colonies (superscript n = number of colonies). Note that the same colonies have not necessarily been monitored in each region each year and that the number of pairs given here are sample sizes (and do not necessarily indicate population changes between years).

Region	2004 chicks fledged/AOT			2005 chicks fledged/AOT		
	AOT ⁿ	Range	Overall	AOT ⁿ	Range	Overall
Shetland	465 ⁹	0.00-0.50	0.08	369 ⁷	0.00-0.57	0.23
Orkney	61 ³	0.00-0.27	0.23	70 ⁷	0.00-2.00	0.39

Table 3.10.4 Breeding success (chicks fledged per apparently occupied territory) of great skuas 2004–2005 and 1986–2004 at selected sites referred to in the text.

Region/site	2004	2005	1986–2004	
			Mean (\pm s.e.)	No. of years
Shetland				
Hermaness (Unst)	0.34	0.51	0.82 (0.06)	17
Fetlar	0.15	0.57	0.76 (0.11)	10
Noss	0.10	0.17	0.52 (0.06)	17
Mousa	0.15	0.17	0.72 (0.09)	10
Fair Isle	0.01	0.01	0.69 (0.09)	16
Foula	0.01	0.32	0.57 (0.09)	16
Orkney				
North Hill, Papa Westray	0.27	0.57	0.65 (0.09)	9

Erratum: A large decrease of great skuas on South Hoy in 2004 was falsely attributed to Swona in the 2004 report.

3.11 Mediterranean gull *Larus melanocephalus*

Breeding numbers and breeding success (Tables 3.11.1)

Mediterranean gull was an extreme rarity in Britain as recently as the 1930s but numbers have increased substantially in recent decades. Colonies around the Black Sea increased from an estimated 93,500 pairs in 1961 to a minimum of 330,000 pairs in 1982 (Cramp and Simmons 1983; Siokhin *et al.* 1988), with a range expansion westwards. A small breeding population became established in Hungary in the late 1950s, since when breeding has occurred in most west European countries. Breeding in Britain was first recorded in 1968 with birds nesting annually from 1979 in increasing numbers, a trend mirrored in other countries in central and Western Europe (Donald and Bekhuis 1993).

The breeding population in the United Kingdom and Ireland continues to increase steadily. During 1999-2002, full coverage indicated 113 pairs (Mitchell *et al.* 2004). In 2004, a minimum of 148 pairs were reported and in 2005 there were 224-226 pairs. However, it is difficult to accurately quantify year-to-year changes in breeding numbers because there is incomplete coverage and some birds may move between sites.

In **south-east England**, the species' stronghold, five sites held 206 pairs. At the largest colony numbers almost doubled from 57 pairs in 2004 to 110 pairs, with an increase also noted at a second colony where 37 pairs nested, compared with 27-30 in 2004. However, of two of the other sites one increased from 27 to 46 pairs, while the other declined from 26 to 12 pairs; as these two colonies are *c.*10km apart it is possible that some exchange of birds occurred. At the fifth site only a single pair was present in both years. Overall breeding success measured at four colonies appeared to be high, with productivity of *c.*1.29 chicks fledged per pair. However, gulls at two of the colonies did poorly; the 12 pairs fledged only one or two chicks and the single pair deserted by mid-June.

Numbers slowly increased in **east England**, where five sites held 10-12 pairs. Breeding success data from all five colonies indicated a maximum of 12 chicks fledged. No data were received from regions in the north of England, where up to seven pairs have been present in recent years.

In **Ireland**, Mediterranean gull was reported from three sites, which together held 8 pairs; at one of these numbers doubled to six pairs since 2002. Birds were very successful at this site, fledging seven chicks (1.17 per pair). Immature birds formed two pairs at a fourth site, where display and territorial behaviour was observed, suggesting breeding will occur soon.

Table 3.11.1 Breeding success of Mediterranean gull 2004-2005. Note that the same colonies have not necessarily been monitored in each year so that the number of pairs does not indicate population changes between years. Superscript n= number of colonies.

Region	2004		2005	
	Pairs	Young	Pairs	Young
E England	3 ³	1	10-12 ⁵	<i>c.</i> 12
SE England	114-117 ⁵	<i>c.</i> 123-127	160 ⁴	<i>c.</i> 206-207
All Ireland	-	-	6 ¹	7

3.12 Black-headed gull *Larus ridibundus*

Between 2004 and 2005, numbers of black-headed gulls increased in Orkney, SW and N Scotland and NE and SW England. In most other regions numbers were stable but notable decreases occurred in NE Scotland and NW England. However, changes at single colonies are not necessarily representative of broader trends because black-headed gulls readily move breeding sites between years, more than most gulls. Low productivity was again noted at many sites although the causes were not clear.

Breeding numbers and breeding success (Tables 3.12.1, 3.12.2 and 3.12.3)

In **south-west Scotland**, numbers increased by 38% overall with a particularly large increase noted at The Reef, Tiree where numbers nearly quadrupled. In the Mink-Seabird Project study area (between Mallaig and Tarbert on the Kintyre peninsula), eight colonies held 169 pairs. Declines were evident at the two largest colonies, on Eilean an Ruisg and Eilean Inshaig, with mink *Mustela vison* caught at the latter site. Overall breeding success was moderate, with an average 0.86 chicks fledged per pair, less than in 2004 (1.12 chicks per pair) but higher than in 2002 and 2003 (0.71 and 0.42, respectively). Success at three colonies where mink were successfully controlled was 1.53 chicks fledged per pair, compared with 0.61 at two colonies where mink were active (Craik 2005).

In **Orkney**, numbers at sampled colonies increased by 23%, compared with 2004. Large increases were noted on Shapinsay and at Loch of Banks/The Loons. A decrease occurred on Egilsay where birds moved between four sites before nesting and, although a few small young were seen, none fledged. Success was also low on Shapinsay, where only 150 chicks fledged (c.0.24), and few young were thought to have fledged on North Ronaldsay (A. Duncan, pers. comm.). In **Shetland**, birds on Fetlar were successful for the site; seven chicks fledged from 20 pairs (0.35 chicks per pair). This contrasts with 2004, when no birds nested, complete failure in 2000, 2002 and 2003 and success of 0.10-0.15 in 1999 and 2001 (Devine and Smith 2005).

Table 3.12.1 Regional population changes at monitored black-headed gull colonies, 2004-2005. Figures are breeding pairs, apparently incubating adults or apparently occupied nests in May-June. Regional samples of less than 100 pairs are excluded.

Region	2004	2005	2004-2005 % change
SW Scotland ^a	244	336	+37.7
Orkney ^b	745	915	+22.8
N Scotland ^c	580	746	+28.6
NE Scotland ^d	892	c.539	-39.6
NE England ^e	3,360	4,549	+35.4
E England ^f	c.10,900	c.10,014	-8.1
SE England ^g	6,750	7,315	+8.4
SW England ^h	165	213	+29.1
NW England ⁱ	2,516	2,030	-19.3
NE Ireland ^j	3,734	3,675	-1.6

Colonies: ^a Mersehead, Tiree Reef, Rheisa MhicPhaidean, Eilean Inshaig, Eilean an Ruisg, Airds Islet, Liath-sgeir Mhor, Black Rock (Crinan); ^b Shapinsay, Egilsay, The Loons, Loch of Banks, Brodgar, Onziebust; ^c Insh Marshes; ^d Loch of Strathbeg, Sands of Forvie; ^e Farne Islands, Coquet Island, Haverton Hole, Fairburn Ings, Reads Isle, Dearne Valley; ^f Snettisham, Blakeney Point, Butley River, Scolt Head, Snettisham, Minsmere, Havergate, Hamford Water, Strumpshaw Fen; ^g Rye Harbour, Dungeness, Chichester, Langstone Harbour, Hayling Oysterbeds, North Solent; ^h Brownsea Island; ⁱ Hodbarrow, Rockliffe, Dee Estuary, Leighton Moss; ^j Strangford Lough, Carlingford Lough, Big Copeland Island.

In **north Scotland**, 746 pairs nested at Insh Marshes, which suggests numbers increased since 2004, when an estimated 580 pairs were present. However, 1,644 pairs were present in 2000 so numbers are currently less than half of that. The largest decrease between 2004 and 2005 occurred in **north-east Scotland**, where numbers at sample colonies fell by 40%. The largest colony, at Sands of Forvie NNR, held approximately 38% fewer birds than in 2004, although thick vegetation prevented accurate nest counts in the main colony. Vegetation also prevented accurate assessment of fledging success, but a peak of 95 fledged young on 10 July suggests that it was a poor breeding season there. At the Loch of Strathbeg, numbers have fallen in recent years; only eight pairs nested in 2005, compared with 32 in 2004 and 88 in 2003. At Loch of Kinnordy (**south-east Scotland**) only 25 pairs nested, compared with 225 in 2003.

Large numbers of black-headed gulls were present in **north-east England**. Numbers at sample colonies increased by 35% overall, with notable proportional increases at Coquet Island (highest count since 1993), Fairburn Ings and Farne Islands (highest count during SMP). Numbers were unchanged at Read's Island but colonies in the Dearne Valley decreased by 30%. No birds nested at Terrington Outer Trial Bank, a colony which regularly held 500-900 pairs in the late 1980s. On Coquet Island, heavy depredation of eggs by Eurasian jackdaws *Corvus monedula* was noted, resulting in low productivity of 0.41 chicks per pair (Lowe 2005). In contrast, birds at the Dearne Valley colonies and at Read's Island were successful, fledging approximately 350 and 50 chicks respectively.

In east and south-east England, although the sizes of some large colonies were only estimated, there was little change in overall numbers; regional totals fluctuated by only $\pm 8\%$ since 2004. In **east England**, numbers were believed to be stable at Hamford Water, where again 5,000 pairs was the estimate. Decreases were reported at Snettisham and Scolt Head but it is possible that some birds moved to Blakeney Point (approximately 40km and 20km away respectively), where numbers increased. Elsewhere, decreases were also noted at Havergate and Strumpshaw Fen, while numbers increased at Minsmere. Breeding success at Blakeney Point was low, where a maximum of 400 chicks was fledged (*c.*0.40 per pair), but birds at Scolt Head were more successful, fledging a maximum of 2000 chicks (*c.*1.17 per pair). Success was also high at Gibraltar Point, where 45-60 pairs fledged 75-125 chicks.

In **south-east England**, increases of 20% or more were recorded at Rye Harbour and North Solent NNR, although the latter site was deserted by mid-June, probably because of fox *Vulpes vulpes* activity. There was little evidence of change in the largest colony, at Langstone Harbour. Few birds now nest at Dungeness, and none at Chichester Harbour, where long-term declines are apparent; both colonies held over 1,000 pairs as recently as 1994. Numbers decreased by 60% at Hayling Oysterbeds, probably due to the presence of rats *Rattus sp.*, which caused complete breeding failure there. Complete failure was also recorded at Dungeness, but at Rye and Langstone harbours success was high, with at least one chick per pair fledging at each colony.

At Brownsea Island (**south-west England**), 213 pairs nested, the most since 1999. Breeding success, at *c.*0.56 chicks per pair, although relatively low was higher than recent years; in two of the previous four seasons productivity was less than 0.25 chicks per pair. The only data received from **Wales** were from the Valley Lakes, where numbers decreased by 59% to 43 pairs since 2003. A decline was also apparent in **north-west England** since 2004, numbers falling by 19% overall. Decreases were reported from all colonies, ranging from 12% at Hodbarrow to 33% at the now small Rockcliffe colony. These two sites are similar to others mentioned above as both show long-term declines from the late 1980s or early 1990s, when over 1,000 pairs nested at each. However, national censuses indicate the total English population remained stable between 1985 and 2002 (Mitchell *et al.* 2004). Birds at the Dee Estuary were successful, fledging close to one chick per pair.

Table 3.12.2 Population change of black-headed gull 2004-2005 and 1986-2004 at selected colonies mentioned in the text. Figures are breeding pairs, apparently incubating adults or apparently occupied nests in May-June.

Region/Site	2004	2005	2004-2005 % change	1986-2004	
				Mean (\pm s.d.)	No. of years
SW Scotland					
Eilean Inshaig	101	86	-14.8	123 (93)	15
Eilean an Ruisg	62	44	-29.0	18 (24)	6
The Reef, Tiree	42	160	+281.0	29 (18)	2
Shetland					
Fetlar	0	20	-	26 (31)	9
Orkney					
Egilsay	154	21	-86.4	101 (50)	4
Shapinsay	425	620	+45.9	490 (58)	4
Loch of Banks/The Loons	158	273	+72.8	163 (7)	2
N Scotland					
Insh Marshes	580	746	+28.6	580 (-)	1
NE Scotland					
Loch of Strathbeg	32	8	-75.0	1,103 (998)	5
Sands of Forvie	860	531	-38.3	410 (400)	16
NE England					
Coquet Island	2,464	3,501	+42.1	2,867 (934)	18
Farne Islands	301	396	+31.6	124 (80)	18
Fairburn Ings	210	335	+59.5	230 (28)	2
Read's Island	50	50	0.0	50 (-)	1
Dearne Valley	370	260	-29.7	330 (-)	1
E England					
Scolt Head	c.2,250	c.1,705	-24.2	1,996 (703)	4
Blakeney Point	c.800	c.1,000	+25.0	978 (1,174)	5
Snettisham	1,970	1,355	-31.2	1,632 (478)	2
Minsmere	126	423	+235.7	262 (190)	5
Havergate	450	323	-28.2	368 (432)	7
Hamford Water	c.5,000	c.5,000	0.0	4,053 (884)	3
Strumpshaw Fen	292	201	-31.2	292 (-)	1
SE England					
Rye Harbour	1,075	c.1,340	+24.7	483 (359)	16
Dungeness	15	5	-67.0	403 (387)	11
Chichester Harbour	2	0	-100.0	946 (644)	13
Langstone Harbour	4,590	4,743	+3.3	1,544 (1,700)	15
North Solent NNR	c.1,000	c.1,200	+20.0	5,843 (2,365)	19
Hayling Oysterbeds	68	27	-60.3	45 (33)	2
SW England					
Brownsea Island	165	213	+29.1	121 (61)	10
NW England					
Leighton Moss	1,463	1,178	-19.5	1,415 (68)	2
Hodbarrow	400	350	-12.5	305 (365)	11
Rockcliffe Marsh	3	2	-33.3	560 (478)	8
Dee Estuary	650	510	-21.5	400 (354)	2
NE Ireland					
Strangford Lough	3,452	3,097	-10.3	4,247 (1,449)	19
Carlingford Lough	7	78	+1,014.3	20 (10)	10
Big Copeland Island	275	c.500	+81.8	241 (118)	7

Numbers in **north-east Ireland** were stable. Increases were noted at Carlingford Lough and on Big Copeland Island but fewer nested at Strangford Lough. No data were available on breeding success. Elsewhere, at Larne Lough an estimated 1,775 pairs represented a 42% increase since 2003. At Lady's Island Lake (**south-east Ireland**), 1,042 pairs were counted compared with 961 in 2002.

Table 3.12.3 Breeding success (chicks fledged per pair) of black-headed gull 2004-2005 and 1986-2004 at selected colonies mentioned in the text. Figures in parentheses under 2004 and 2005 are the number of nests from which the success estimates were derived.

Region/Site	2004	2005	1986-2004	
			Mean (\pm s.e.)	No. of years
Shetland				
Fetlar	-	0.35 (20)	0.25 (0.11)	9
Orkney				
Egilsay	0.05 (154)	0.00 (21)	0.27 (0.14)	5
Shapinsay	1.06 (425)	0.24 (620)	0.58 (0.24)	3
NE England				
Coquet Island	1.05 (2,464)	0.41 (3,501)	1.32 (0.09)	9
Dearne Valley	c.0.91	c.1.35 (260)	0.91 (-)	1
Read's Island	-	c.1.00 (50)	-	-
E England				
Blakeney Point	c.0.56 (800)	c.0.40 (1,000)	0.29 (0.14)	3
Scolt Head	c.0.78 (2,250)	c.1.17 (1,705)	0.90 (0.12)	2
Gibraltar Point	-	c.1.89 (c.53)	-	-
SE England				
Rye Harbour	c.0.98 (1,075)	c.1.50 (1,340)	0.78 (0.18)	11
Dungeness	0.00 (2)	0.00 (2)	0.30 (0.12)	7
Langstone Harbour	c.0.88 (4,590)	c.1.10 (4,743)	0.61 (0.12)	11
Hayling Oysterbeds	0.59 (68)	0.00 (27)	0.75 (0.16)	2
North Solent NNR	c.0.02 (1,000)	0.00 (1,200)	1.41 (0.41)	8
SW England				
Brownsea Island	0.85 (165)	c.0.56 (213)	0.50 (0.16)	4
NW England				
Rockcliffe Marsh	0.33 (3)	0.50 (2)	0.13 (0.07)	4
Dee Estuary	-	c.0.98 (510)	-	-

3.13 Mew gull *Larus canus*

Overall, breeding numbers of mew gulls increased between 2004 and 2005, especially in NW Scotland, Orkney and NE Ireland, although most data came from the small or medium-sized colonies and geographical coverage of this species was limited in Shetland and NE Scotland. Breeding success was enhanced in those colonies where mink were controlled in western Scotland, but was generally moderate or low in other regions.

Breeding numbers and breeding success (Tables 3.13.1, 3.13.2 and 3.13.3)

As usual, the majority of mew gull data received came from colonies in **south-west** and **north-west Scotland**. Many colonies surveyed in these regions are small islets containing few pairs; changes at some of the larger colonies are presented in Table 3.13.2. The overall trend in numbers along the west coast of Scotland has fluctuated since monitoring began, with an increase during 1996-2000, followed by a decline between 2000 and 2003, since when numbers at sampled colonies appear to have risen again, at least in the north-west. In the Mink-Seabird Project study area (Mallaig to Tarbert on the Kintyre peninsula) spread over both regions, 44 sites surveyed held a minimum of 1,210 pairs.

Efforts to control mink were again carried out at several sites and the following data considers only those colonies holding ten or more pairs. At eight colonies where mink were successfully controlled productivity was estimated at 1.10 (*c.* 703 chicks fledged from 636 pairs). This contrasted with 16 colonies with no (or unsuccessful) mink control, where success was only 0.28 (*c.* 138 chicks fledged from 493 pairs). This suggested that mink reduced productivity by 75% at unprotected colonies (Craik 2005). Between 1996 and 2004, the average apparent reduction in productivity of mew gulls due to mink predation was 52% (s.d. 15%, range 27-76%). Elsewhere, on Tiree, birds at the Reef were highly successful fledging 2.00 chicks per pair.

Table 3.13.1 Regional population changes at monitored mew gull colonies, 2004-2005. Figures are breeding pairs, apparently incubating adults or apparently occupied nests in May-June. Regional samples of less than 50 pairs are excluded.

Region	2004	2005	2004-2005 % change
SW Scotland ^a	<i>c.</i> 984	<i>c.</i> 1,008	+2.4
NW Scotland ^b	<i>c.</i> 320	<i>c.</i> 403	+25.9
Orkney ^c	507	625	+23.3
N Scotland ^d	146	97	-33.6
NE Ireland ^e	410	543	+32.4

Colonies: ^a Suite of 23 small islets in Argyll and Bute; Coll, Tiree Reef, Loch Gruinart, Sanda; ^b Suite of 12 small islets in Lochaber; Eigg, Canna; ^c North Hill, Whaness, Sandy Loch, Brodgar, Loch of Banks, The Loons; ^d North Sutor, Alness Point; ^e Strangford Lough, Copeland Islands, Isle of Muck.

In **Orkney**, numbers at sampled colonies increased by 23% overall. A particularly large proportional increase was noted at the Loons, numbers were relatively stable at Loch of Banks and Whaness and Sandy Loch (both Hoy) and the small colony at North Hill, Papa Westray held five pairs fewer than in 2004. Productivity was low at North Hill and Whaness (0.12 and 0.30 chicks fledged per pair, respectively) but birds at Sandy Loch fledged 0.95 chicks per pair. Several other colonies, where counts of nesting pairs were impractical, reported moderate numbers of adults present. Assessment of breeding success data at these colonies was largely subjective, based on visits to ring chicks or one-off counts of large young; nevertheless it appeared to be a fairly successful year overall with moderate numbers of young fledged (*c.* 1.00 fledged chick per pair) (Meek 2005). Data for **Shetland** were only available for two small colonies; numbers were stable on Mousa, and a decrease was noted on Fair Isle, where success was again low at 0.44 chicks fledged per pair.

In **north Scotland**, overall numbers decreased by 33%. At Nigg, the number nesting was similar to that in 2003 prior to the increase recorded last year. Breeding success there was low, for the second successive year, at 0.05 chicks fledged per pair, mainly due to high levels of egg predation. The long-term decline, due to disturbance by man, continued at Alness Point where just 15 nests were found; for the fifth successive year all nests failed. Around Bonar Bridge, three small colonies holding 83 pairs had more success, fledging 0.59 chicks per pair, while a fourth colony visited, at Loch a Bhaid, held 25 pairs fledging 0.40 chicks per pair. (A. Ramsay, pers. comm.).

Table 3.13.2 Population changes of mew gull 2004-2005 and 1986-2004 at selected sites referred to in the text. Figures are apparently occupied nests, apparently occupied territories or pairs.

Region/sites	2004	2005	2004-2005 % change	1986-2004	
				Mean (\pm s.d.)	No. years
SW Scotland					
Kilmaronag	304	320	+5.3	304 (44)	15
Glas Eilean	60	55	-8.3	68 (18)	11
Eilean an Ruisg	61	49	-19.7	42 (15)	15
Eilean Rubha an Ridire	30	54	+80.0	9 (9)	8
Aird's Islet	30	22	-26.7	24 (7)	12
Abbot Island	31	47	+51.6	25 (10)	14
Ban Eileanan	27	12	-55.6	51 (16)	10
Eilean Inshaig	32	35	+9.4	30 (19)	15
Tucker's Islet	110	95	-13.6	90 (12)	11
Sanda	78	72	-7.7	53 (17)	12
The Reef, Tiree	69	81	+17.4	59 (14)	2
Coll	12	14	+16.7	12 (-)	1
NW Scotland					
Canna	6	9	+50.0	13 (4)	19
Eigg	80	76	-5.0	64 (9)	18
Barcaldine	<i>c.</i> 50	<i>c.</i> 70	+40.0	32 (18)	10
Eilean Nan Gall	33	37	+12.1	13 (8)	12
Ballachulish Beach	53	86	+62.3	62 (8)	5
Eilean Munde	45	70	+55.6	12 (12)	14
Eilean Dubh	17	15	-11.8	19 (13)	12
Sgeirean Sallachain	10	7	-30.0	18 (11)	16
Narrows, Loch Teacuis	9	14	+44.4	6 (4)	8
Shetland					
Mousa	10	11	+10.0	6 (4)	3
Fair Isle	13	9	-30.8	8 (2)	19
Orkney					
North Hill	13	8	-38.5	39 (23)	5
Loch of Banks	31	32	+3.2	34 (10)	3
The Loons	215	357	+66.0	287 (85)	3
Whaness, Hoy	<i>c.</i> 200	<i>c.</i> 180	-10.0	210 (14)	2
Sandy Loch, Hoy	41	44	+7.3	41 (-)	1
N Scotland					
Nigg	126	82	-34.9	63 (48)	15
Alness Point	20	15	-25.0	74 (29)	9
SE England					
Dungeness	11	10	-9.1	11 (1)	8
NE Ireland					
Strangford Lough	167	170	+1.8	91 (41)	18
Big Copeland Island	<i>c.</i> 225	<i>c.</i> 350	+55.6	158 (79)	7

Small numbers of mew gulls were reported at various colonies in England. Data were received from Scolt Head and Blakeney Point (**east England**), where a total of six pairs fledged no young (*cf.* nine pairs fledged no young in 2004), possibly due to a lack of food and predation by larger gulls. At Dungeness (**south-east England**), ten pairs nested, a typical number for the site which has held between 9-13 pairs since 1994. Numbers increased by 32% in **north-east Ireland**, where 170 pairs at Strangford Lough, although few more than in 2004, was the highest count on record. One of the largest increases in north-east Ireland was at the Copeland Islands, especially Big Copeland Island, where an estimated 350 pairs was present, compared with 225 in 2004. Fourteen pairs on Old Lighthouse island fledged 14 young (N. McKee, pers. comm.).

Table 3.13.3 Breeding success (chicks per pair) of mew gulls 2004-2005 and 1986-2004 at selected colonies mentioned in the text. Figures in parentheses under 2004 and 2005 are the number of nests from which the estimates of success are derived.

Region/sites	2004	2005	1986-2004	
			Mean (\pm s.e.)	No. years
SW Scotland				
The Reef, Tiree	-	2.00 (49)	-	-
Shetland				
Fair Isle	0.15 (13)	0.44 (9)	0.47 (0.09)	16
Orkney				
Papa Westray	0.15 (13)	0.12 (8)	0.15 (-)	1
Whaness	c.0.24 (200)	c.0.30 (180)	0.67 (0.44)	2
Sandy Loch	-	0.95 (44)	-	-
N Scotland				
Nigg	0.04 (122)	0.05 (82)	0.94 (0.14)	9
Alness Point	0.00 (20)	0.00 (15)	0.47 (0.18)	9
Bonar Bridge	-	0.59 (83)	-	-
Loch a' Bhaid	-	0.40 (25)	-	-
E England				
Blakeney Point	0.00 (3)	0.00 (3)	0.00 (-)	2
Scolt Head	0.00 (6)	0.00 (3)	0.30 (0.30)	2
NE Ireland				
Old Lighthouse Island	-	1.00 (14)	-	-

3.14 Lesser black-backed gull *Larus fuscus*

Between 2004 and 2005, a large increase was noted in SE Ireland and a lesser increase in Wales. Decreases occurred in SW Scotland and E England. Breeding success data indicated high productivity on the Isle of May (SE Scotland) and mink again depressed productivity in SW Scotland. Numbers in some large mixed colonies appear to have declined in recent years.

Breeding numbers and breeding success (Tables 3.14.1, 3.14.2 and 3.14.3)

Although the decline evident in **south-west Scotland** since 2000 appeared to continue, with sample colonies holding 23% fewer pairs than in 2004. However, this excludes Eilean Mor, broadly estimated to hold 100-200 pairs in 2005, compared to an accurate count of 60 in 2004. Clearly, an increase occurred there which, depending on its size, could have a major effect on the regional trend. This island lies within the Mink-Seabird Project study area (Mallaig to Tarbert on the Kintyre peninsula) where 17 sites held a minimum of 338 pairs. Breeding success data were collected at 11 colonies. Mink were controlled at a single site, Eilean Mor, which perhaps explains the noted increase in pairs there, with productivity estimated at 0.50-1.00 chicks fledged per pair. This compared with 0.13 chicks fledged per pair from 230 pairs at ten sites with no, or unsuccessful, mink control (Craik 2005). The effect of mink was most noticeable at Eilean Gamhna, where only 4 pairs of lesser black-backed

gulls were found, compared to *c.* 90 in 2004, and all seabirds nesting on the island failed completely. Outside this study area, no nesting pairs were found on Lunga for the first time since recording began in 1994, although numbers on the island never exceeded nine pairs. The population on Sanda was also at its lowest level since 1986. A survey of Lady Isle, which was estimated to hold 1,000 pairs in 2000, recorded 300 pairs. Numbers were possibly overestimated in 2000 but have increased since 1972 (20 pairs) and 1982 (125 pairs), when the population was managed for the benefit of nesting terns (which are no longer present) (Grieve 2005). In **north-west Scotland**, only four pairs nested on Canna, the third successive year of decline, numbers having fallen by 90% since 2002 (Swann 2005a). No change in numbers was noted on Eigg.

Table 3.14.1 Regional population changes at monitored lesser black-backed gull colonies, 2004-2005. Figures are breeding pairs, apparently incubating adults or apparently occupied nests in May-June. Regional samples < 100 pairs are excluded.

Region/site	2004	2005	2004-2005 % change
SW Scotland ^a	<i>c.</i> 355	<i>c.</i> 275	-22.5
SE Scotland ^b	1,448	1,562	+7.9
E England ^c	266	210	-21.1
Wales ^d	14,776	17,534	+18.7
NE Ireland ^e	<i>c.</i> 335	<i>c.</i> 351	+4.8
SE Ireland ^f	133	260	+95.5

Colonies: ^a Suite of 9 small islets in Argyll and Bute; Coll, Lunga, Sanda; ^b Isle of May, Haystack, The Lamb, Inchmickery, Fidra; ^c Havergate, Minsmere; ^d Caldey, Barafundle-Giltar, Stackpole Head, Skomer, Skokholm, Ramsey, Bardsey, Ynys Gwylan Fawr, South Stack, Elegug Stacks and nearby coast; ^e Lighthouse Island, Mew Island, Strangford Lough, Isle of Muck; ^f Lambay.

In other western regions of the UK and in Ireland, numbers increased or at least remained stable. Large numbers are monitored annually in **Wales**, where sample colonies held 19% more pairs than in 2004. Increases were noted on Skokholm, Bardsey and Caldey, numbers were stable on Ramsey and a decrease was recorded at South Stack. Especially notable was the 20% increase on Skomer, the largest colony monitored in the region, although the colony held 1,500 fewer than it did prior to the decline between 2002 and 2003, when numbers fell by one-third. Breeding success on Skomer, estimated from recapture of ringed chicks, was 0.56 chicks fledged per pair, well below that needed for the population to sustain itself but the highest value recorded at the colony since 1997 (Perrins 2005). Breeding success also appeared to be relatively high on Bardsey but no young fledged from the small number of pairs nesting on Ynys Gwylan Fawr. In **north-east Ireland**, there was little change in overall numbers between 2004 and 2005. Decreases were recorded at Mew and Old Lighthouse islands, with increases at Strangford Lough, where numbers were at their highest since 2000, and at the small colony on the Isle of Muck. In **south-east Ireland**, 260 pairs was counted on Lambay in 2005, almost double that recorded in 2004 (133) and more than compensating for the decrease of 38% recorded between 2002 and 2004 (S. Newton, pers. comm.).

In northern and eastern regions of the UK, few sizeable colonies are present. Those that are regularly monitored are mostly in **south-east Scotland**, where numbers increased slightly between 2004 and 2005, and in **east England**, where a decrease was recorded. The largest colony, on the Isle of May, showed little change over the period. Nearby, a decrease was detected on Inchmickery, but on Fidra numbers increased, although some large fluctuations have occurred there over the last decade (e.g. 660 pairs in 1998, declining to 51 in 2001 then increasing to 300 in 2003). Productivity on the Isle of May was estimated at 1.40 chicks per nest (Bradbury and Alampo 2005), the highest recorded on the island in the period of the SMP. At Havergate, numbers declined by 21%. In **Orkney**, numbers fell by half on North Hill, Papa Westray, where breeding success was 0.40 chicks fledged per pair. Elsewhere in the region, flush counts of adults indicated moderate numbers in colonies at Birsay Moors (*c.* 600 adults) and Hobbister (*c.* 350 adults) but no data were available on breeding success. Most other

colonies monitored in eastern regions in 2004 and 2005 were small; e.g. 11 pairs nested at Nigg (**north Scotland**), one more than in 2004, and numbers increased at Dungeness (**south-east England**) to 25 pairs.

Table 3.14.2 Population changes of lesser black-backed gull 2004-2005 and 1986-2004 at selected colonies referred to in the text. Figures are breeding pairs, apparently incubating adults or apparently occupied nests in May-June.

Region/site	2004	2005	2004-2005 % change	1986-2004	
				Mean (\pm s.d.)	No. years
SW Scotland					
Sanda	50	40	-20.0	72 (15)	13
NW Scotland					
Eigg	35	35	0.0	37 (11)	18
Canna	13	4	-69.2	36 (8)	19
Orkney					
North Hill	20	10	-50.0	20 (8)	5
N Scotland					
Nigg	10	11	+10.0	5 (3)	6
SE Scotland					
Isle of May	1,221	1,320	+8.1	1,121 (394)	19
Inchmickery	134	109	-18.7	146 (59)	8
Fidra	90	131	+45.6	307 (224)	12
E England					
Havergate	264	208	-21.2	268 (21)	3
SE England					
Dungeness	8	25	+212.5	7 (3)	5
Wales					
Skomer	11,261	13,537	+20.2	13,790 (2,180)	17
Skokholm	2,143	2,417	+12.8	3,077 (756)	15
Ramsey Island	199	205	+3.0	276 (92)	7
South Stack	118	104	-11.9	64 (54)	15
Bardsey	532	596	+12.0	382 (162)	19
Caldey	468	616	+31.6	357 (201)	18
NE Ireland					
Mew Island	50	40	-20.0	44 (5)	6
Old Lighthouse Island	200	180	-10.0	205 (41)	10
Strangford Lough	75	118	+57.3	101 (63)	19
Isle of Muck	10	13	+30.0	13 (10)	5
SE Ireland					
Lambay	133	260	+95.5	188 (90)	6

Table 3.14.3 Breeding success (chicks fledged per pair) of lesser black-backed gull 2004-2005 and 1986-2004 at selected colonies mentioned in the text. Figures in parentheses under 2003 and 2004 are the number of nests from which the estimates of success are derived.

Region/Site	2004	2005	1986-2004	
			Mean (\pm s.e.)	No. of years
Orkney				
North Hill	-	0.40 (10)	1.20 (-)	1
SE Scotland				
Isle of May	0.59 (194)	1.40 (170)	0.85 (0.07)	16
Wales				
Skomer	0.31 (11,261)	0.56 (13,537)	0.25 (0.04)	16
Bardsey	c.0.92 (532)	c.0.84 (596)	0.67 (0.08)	9
Ynys Gwylan Fawr	-	0.00 (7)		

Mixed colonies of lesser black-backed and herring gulls

Some of the largest colonies of lesser black-backed gulls in the UK also contain a smaller number of herring gulls. Because nests of the two species are difficult to tell apart, monitoring of numbers and breeding success at such colonies usually does not distinguish between the species. In **north-west England**, the mixed colony at South Walney contained an estimated 13,756 nests, with a ratio of approximately 3:1 in favour of lesser black-backed gull, continuing the rapid decline of this major colony since 2000, when it held an estimated 27,950 nests (ratio of 4.2:1). At Rockcliffe Marsh, after the large decline between 2002 and 2003, numbers appear to have stabilised, with *c.* 2,625 pairs present, equal to that estimated in 2004, with a 4:1 ratio in favour of lesser black-backed gulls. Breeding success was difficult to judge but it is thought that a minimum of 1,000 chicks fledged (M. Carrier, pers. comm.). The inland colony at Tarnbrook Fell, which is composed mostly of lesser black-backed gulls, with 2-3% herring gulls, held an estimated 8,269 nests with eggs (*cf.* 7,735 in 2004) although 1,330 of those were in an area not previously included in the annual census. Gulls were late in arriving at the colony, as in 2004, taking up territories by mid-April with eggs laid mainly during the second week of May. The programme of controlled disturbance, using a combination of falconry coupled with removal of nests, continues to limit nesting numbers, especially in the centre of the colony. However, in response the main colony is expanding in extent, with new satellite colonies developing some distance away along the main flight lines to the coast (Sowter 2005). In **north-east England**, numbers on the Farne Islands decreased by 27% to 971 pairs since 2004. The percentages of lesser black-backed (44%) and herring gulls (56%) changed little since it was last estimated in 2002, when it was 50:50 (Walton *et al.* 2005). Nearby, on Coquet Island, numbers also declined since 2004, from 89 to 55 pairs, an estimated 91% of which were lesser black-backed gulls (*cf.* 85% of 137 pairs in 2002).

3.15 Herring gull *Larus argentatus*

Between 2004 and 2005, numbers increased in most regions adjacent to the Irish Sea. In other regions to the north and east, numbers generally decreased, excluding NE Scotland where an increase was recorded and NE England where numbers were stable. The few sites where productivity data was collected indicated a poor year except on Noss (Shetland). In western Scotland, mink activity reduced productivity by 38%.

Breeding numbers and breeding success (Tables 3.15.1 and 3.15.2)

Note: see also entry under 3.14 for mixed colonies of herring and lesser black-backed gulls.

In **south-west** and **north-west Scotland**, fewer pairs were present at sample colonies than in 2004, particularly in the north-west where numbers fell by 30%. The population on Canna declined, for the fifth consecutive year, although the downward trend has been evident since 1989. Only 112 pairs were counted, by far the lowest since monitoring started in 1971 (Swann 2005a). For the fourth successive year on Canna, breeding success was low, at 0.13 chicks fledged per pair, with most nests failing at the egg stage. In the Mink-Seabird Project study area (Mallaig to Tarbert on the Kintyre peninsula), which is spread over both regions, 5,045 pairs were present across 53 sites, mostly small inshore islets. The effects of mink depredation on breeding success were studied at 29 colonies holding at least ten pairs. At nine sites where mink were successfully removed success was 0.86 chicks per pair (*c.* 1,031 pairs). This compared with 0.53 chicks per pair from 20 sites with no (or unsuccessful) mink control (*c.* 2,929 pairs) which, suggests that mink reduced herring gull productivity by about 38% (Craik 2005).

Elsewhere in these regions, numbers on Eigg and Lunga were also at their lowest since 1986. A survey of Lady Isle, which was estimated to hold 1,500 pairs in 2000, recorded 600 pairs. Numbers were possibly overestimated in 2000 but have increased since 1972 (20 pairs) and 1982 (55 pairs), when the population was managed for the benefit of nesting terns (which are no longer present) (Grieve 2005).

Table 3.15.1 Regional population changes at monitored herring gull colonies, 2004-2005. Figures are breeding pairs or apparently occupied nests in May-June. Regional samples < 200 pairs are excluded.

Region/site	2004	2005	2004-2005 % change
SW Scotland ^a	c.4,680	c.4,120	-12.0
NW Scotland ^b	1,280	903	-29.5
N Scotland ^c	298	214	-28.2
NE Scotland ^d	278	435	+56.5
SE Scotland ^e	4,306	3,781	-12.2
NE England ^f	361	341	-5.6
SE England ^g	219	146	-33.3
Wales ^h	4,790	4,958	+3.5
NW England ⁱ	225	292	+29.8
NE Ireland ^j	c.555	c.783	+41.1
SE Ireland ^k	311	359	+15.4

Colonies: ^a Suite of 31 islets in Argyll and Bute; Coll, Lunga, Sanda, Mull of Galloway; ^b Suite of 7 islets in Lochaber; Canna, Eigg; ^c Nigg; ^d Loch of Strathbeg, Sands of Forvie NNR; ^e Isle of May, Inchgarvie, Inchmickery, Eyebroughty, Carr Craig, Fidra, Haystack, The Lamb, Longcraig, St. Abb's Head; ^f Saltburn, Boulby Cliffs, Longnewton Reservoir; ^g Rye Harbour, Dungeness; ^h Caldey, Barafundle to Giltar, Elegug Stacks and nearby coast, Stackpole Head, Skomer, Middleholm, Skokholm, St Margaret's Island, Ramsey, Bardsey, Ynysoedd Gwylan, South Stack.; ⁱ St. Bee's Head, Hodbarrow; ^j Strangford Lough, Copeland Islands, Isle of Muck; ^k Lambay.

Numbers in other western regions of the UK and in Ireland generally increased, or at least remained stable, between 2004 and 2005. In **Wales**, overall numbers were similar in both years and, out of 13 colonies monitored in the region, only on Skokholm, Middleholm and Ramsey were changes greater than 10% detected. Breeding success at three colonies indicated that it was a below-average season at the usually successful colonies on Bardsey and Ynysoedd Gwylan, but birds on Skomer fledged more chicks than average. In **south-west England**, overall numbers at Ballard and Durlston-St. Aldhelm's Head were similar to 2004. In **north-west England**, the number at St. Bee's Head increased by 32% to close to that in 2003, although the reasons for the depressed numbers in 2004 are unclear. Elsewhere, at the Calf of Man numbers had decreased by 36% to 277 pairs since the last survey in 2002 (B. Jones, pers. comm.). Overall numbers also increased in **north-east Ireland**. Large proportional increases were noted at Big Copeland and Old Lighthouse islands but, as reported for St. Bee's Head, the increases were partially an artefact of depressed numbers at those sites in 2004. In contrast, numbers on nearby Mew Island more than doubled between 2003 and 2004, and increased by a similar magnitude in 2005. A decrease was recorded at Strangford Lough. On Lambay (**south-east Ireland**), numbers were also higher than in 2004, and close to the figure recorded for the island in 2002. However, the island's gull population has been in long-term decline, and now numbers are approximately 5% of those recorded in 1999 (S. Newton, pers. comm.).

Table 3.15.2 Population changes of herring gull 2004-2005 and 1986-2004 mean of selected colonies referred to in the text. Figures are breeding pairs or apparently occupied nests in May-June.

Region/site	2004	2005	2004-2005 % change	1986-2004	
				Mean (\pm s.d.)	No. years
SW Scotland					
Lunga	33	20	-39.4	70 (20)	12
NW Scotland					
Canna	372	112	-69.9	1,179 (308)	18
Eigg	300	280	-6.7	383 (107)	16
Shetland					
Noss	23	37	+60.9	70 (19)	19
N Scotland					
Nigg	298	214	-28.2	90 (116)	15
NE Scotland					
Sands of Forvie	277	435	+57.0	383 (144)	8
SE Scotland					
Isle of May	2,428	2,094	-13.8	2,285 (557)	19
Inchgarvie	189	180	-4.8	203 (66)	14
Inchmickery	313	319	+1.9	244 (144)	10
Carr Craig	30	38	+26.7	46 (9)	16
Haystack	12	8	-33.3	17 (4)	11
The Lamb	38	27	-28.9	117 (83)	9
Fidra	1,035	957	-7.5	1,129(329)	12
St. Abb's Head	261	157	-39.8	382 (155)	19
NE England					
Boulby Cliffs	325	290	-10.8	409 (96)	17
Longnewton Reservoir	21	11	-47.6	26 (9)	9
Saltburn	15	40	+166.7	127 (77)	17
E England					
Havergate	47	42	-10.6	71 (47)	3
SE England					
Dungeness	62	122	+96.8	62 (35)	8
Rye Harbour	157	24	-84.7	157 (-)	1
SW England					
Durlston-St Aldhelm's Head	93	82	-11.8	83 (17)	7
Ballard	23	29	+26.1	15 (7)	7
Wales					
Middleholm	103	127	+23.3	105 (19)	9
Skokholm	287	255	-11.1	328 (56)	19
Ramsey Island	206	236	+14.6	184 (34)	7
NW England					
St. Bee's Head	220	290	+31.8	509 (133)	18
NE Ireland					
Strangford Lough	302	264	-12.6	696 (520)	19
Big Copeland	c.125	c.200	+60.0	213 (65)	5
Lighthouse Island	25	c.90	+260.0	104 (48)	10
Mew Island	75	c.200	+166.7	32 (25)	5
SE Ireland					
Lambay	311	359	+15.4	1,292 (944)	5

In many eastern regions of the UK, numbers decreased between 2004 and 2005. In **north Scotland**, numbers at Nigg generally increased since 1996 but a decrease of 28% was recorded between 2004 and 2005. In **north-east Scotland**, the number at Sands of Forvie increased by 56%, although the colony size has fluctuated markedly in recent years, probably as result of differences in survey dates; most of the lowest counts, but not all, are from later dates in June.

Numbers also declined in **south-east Scotland**, with a 40% decrease at St. Abb's Head particularly notable; its lowest count since 1986. On the Isle of May, the largest colony and hence contributing most toward the regional trend, numbers were at their lowest since 1993. At Inchgarvie, Inchmickery, and Fidra numbers appeared relatively stable. Large proportional changes were recorded at Carr Craig (increase) and Haystack and The Lamb (decreases) although these colonies are small. Breeding success on the Isle of May was below average, at 0.60 chicks per pair. Overall numbers were stable in **north-east England**, where decreases at Boulby Cliffs and in the small colony at Longnewton were offset by the increase at Saltburn; at all three colonies numbers are currently 60-90% lower than their peaks during 1986-2004. In **south-east England**, numbers decreased by 33%, although the changes at both reporting colonies were vastly different; numbers almost doubled at Dungeness but decreased by 85% around Rye Harbour. Elsewhere, numbers at Havergate (**east England**) were similar to 2004.

Few sizable colonies were monitored in the Northern Isles. On Noss (**Shetland**), where low numbers were present in 2004, an increase of 61% was recorded, but the 37 pairs that nested are fewer than in 2003. Pairs there had another very successful season, fledging 1.32 chicks per pair, well above average for the colony. In **Orkney**, ten pairs at North Hill, Papa Westray fledged just two chicks, but colonies on Westray, Stronsay and at Deerness and Holm were apparently successful (Meek 2005).

Table 3.15.3 Breeding success (chicks fledged per pair) of herring gull 2004-2005 and 1986-2004 at selected colonies mentioned in the text. Figures in parentheses under 2004 and 2005 are the number of nests from which the estimates of success are derived.

Region/Site	2004	2005	1986-2004	
			Mean (\pm s.e.)	No. of years
NW Scotland				
Canna	0.16 (372)	0.13(112)	0.79 (0.17)	15
Shetland				
Noss	1.39 (23)	1.32 (37)	0.77 (0.15)	7
Orkney				
North Hill	-	0.20 (10)	1.40 (-)	1
SE Scotland				
Isle of May	1.14 (160)	0.60 (184)	1.01 (0.08)	16
Wales				
Skomer	0.78 (54)	0.87 (52)	0.76 (0.10)	10
Bardsey	1.20 (543)	1.01 (595)	1.24 (0.11)	9
Ynysydd Gwylan	1.41 (189)	1.02 (206)	1.17 (0.08)	6

3.16 Great black-backed gull *Larus marinus*

Numbers were stable in most regions between 2004 and 2005, although decreases were recorded in NW and N Scotland, with that in the latter region particularly large, and an increase was noted in Shetland. Breeding success was generally low except in Wales and at Ballard (SW England).

Breeding numbers and breeding success (Tables 3.16.1, 3.16.2 and 3.16.3)

In **south-west Scotland**, numbers at colonies sampled in both 2004 and 2005 were similar, but a decrease of 19% was recorded in **north-west Scotland**. In the Mink-Seabird Project study area (Mallaig to Tarbert on the Kintyre peninsula) which encompasses parts of both regions, a minimum of 498 pairs was found within 53 sites. At 38 sites where productivity was monitored, breeding success averaged *c.*0.72 across 278 nests. Mink control was carried out at six of these sites, where productivity was 1.10 young per pair from 31 nests, compared with 0.65 chicks per pair from 247 nests at 32 sites with no (or unsuccessful) mink control (Craig 2005). The difference suggests that mink reduced productivity in this species by 41%, although the activities of other predators may have contributed to this result; for example, signs of rat activity were found on two islands. Elsewhere in these regions, decreases were recorded on Sanda, Lunga and Canna with numbers at each site the lowest since monitoring began. Breeding success at the latter site was also the lowest on record, averaging 0.13 chicks per nest from 23 monitored (Swann 2005a). On Eigg, numbers were the same as in 2004. Over a longer period, substantial declines were noted on the remote island of North Rona, where numbers fell by 44% to 551 pairs since 1998 (Robinson 2005). A survey of Lady Isle, estimated to hold 200 pairs in 2000, recorded just 30 pairs. Numbers may have been overestimated in 2000 but have certainly decreased over the longer term (200 and 150 pairs in 1989 and 1990 respectively). Prior to this numbers were similar to 2005 as in the 1970s the population was managed for the benefit of nesting terns (which are no longer present) (Grieve 2005).

Table 3.16.1 Regional population changes at monitored great black-backed gull colonies, 2004-2005. Figures are breeding pairs or apparently occupied nests in May-June. Regional samples of < 50 pairs are excluded.

Region	2004	2005	2004-2005 % change
SW Scotland ^a	<i>c.</i> 332	<i>c.</i> 312	-6.0
NW Scotland ^b	122	99	-18.9
Shetland ^c	71	92	+29.6
Orkney ^d	423	424	+0.2
N Scotland ^e	111	24	-78.4
Wales ^f	323	304	-5.9
SE Ireland ^g	145	132	-9.0

Colonies: ^a Suite of 30 small islets in Argyll and Bute, Sanda, Lunga, Coll; ^b Suite of 5 small islets in Lochaber, Eigg, Canna; ^c Noss, Mousa; ^d North Hill, Copinsay, Stourdale, Auskerry; ^e Nigg; ^f Caldey, Barafundle- Giltar, Skomer, Skokholm, Middleholm, Stackpole Head plus Elegug Stacks, Ramsey Island, South Stack, Valley Lakes, Bardsey, Ynysydd Gwylan; ^g Lambay.

In **Shetland**, numbers increased by 30% at sampled colonies, with a particularly notable increase on Noss, which held 48% more pairs than in 2004; 77 pairs was the highest count at the site since 1990. Most pairs (67) nested on inaccessible Cradle Holm, where thick vegetation prevented accurate assessment of breeding success, but a minimum of 23 chicks fledged there compared with 14 chicks from ten nests around the rest of the island (Sykes and Bliss 2005). On Mousa, numbers fell since 2004, and 0.87 chicks per pair fledged.

Between 2004 and 2005, overall numbers at sampled colonies in **Orkney** were stable. No substantial change was detected in the populations on Auskerry and Copinsay, a proportionally small increase

was detected at Stourdale and a larger decrease at North Hill. However, over the longer term, declines were apparent at all four sites and by 2005 numbers were approximately 20-50% of those in the late 1990s. Breeding success appeared to be low; birds at North Hill fledged 0.42 chicks per pair and few chicks were found during ringing trips to Stronsay, Swona, Westray and Stourdale (Meek 2005).

At Nigg, the sole site monitored in **north Scotland**, only 24 pairs were found, the lowest count there since the colony was founded in 1990. For the third successive year complete breeding failure was noted, again probably due to low food availability, as in 2003 and 2004. This apparent lack of food affected other species, both directly (through starvation) and indirectly, as European shag, common guillemot, black-legged kittiwake and mew gulls all suffered increased nest predation by great black-backed gulls (Swann 2005b). In **south-east Scotland**, sample colonies held 21% more pairs than in 2004 (46 vs. 38). The majority of those nested on the Isle of May, where numbers increased from 25 to 32 pairs. Small numbers nest at nearby islands in the Firth of Forth where 14 pairs were found in 2005 (*cf.* 13 in 2004, 14 in 2003). On the Isle of May, a mean success from 17 nests was 1.9 fledglings per nest (Bradbury and Alampo 2005).

Table 3.16.2 Population change of great black-backed gull 2004-2005 and 1986-2004 at selected colonies mentioned in the text. Figures are breeding pairs, apparently incubating adults or apparently occupied nests in May-June.

Region/Site	2004	2005	2004-2005 % change	1986-2004	
				Mean (\pm s.d.)	No. of years
SW Scotland					
Sanda	28	25	-10.7	34 (7)	13
Lunga	42	31	-26.2	52 (13)	12
NW Scotland					
Eigg	18	18	0.0	16 (5)	18
Canna	44	29	-34.1	75 (13)	19
Shetland					
Noss	52	77	+48.1	68 (14)	19
Mousa	19	15	-21.1	14 (6)	4
Orkney					
North Hill	37	31	-16.2	61 (20)	5
Copinsay	287	288	+0.3	546 (211)	2
Auskerry	34	33	-2.9	48 (20)	2
Stourdale, Hoy	65	72	+10.8	163 (138)	2
N Scotland					
Nigg	111	24	-78.4	100 (53)	15
SE Scotland					
Isle of May	25	32	+28.0	15 (8)	13
Wales					
Skokholm	71	68	-4.2	43 (15)	14
Skomer	95	109	+14.7	55 (20)	19
Middleholm	64	40	-37.5	38 (16)	11
Ramsey Island	20	16	-20.0	13 (13)	6
Ynysoedd Gwylan	49	48	-2.0	40 (19)	12
NW England					
Rockcliffe Marsh	20	15	-25.0	21 (20)	10
NE Ireland					
Strangford Lough	44	38	-13.6	57 (23)	19
SE Ireland					
Lambay	145	132	-9.0	139 (36)	6

Along the east and south-east coast of England, the great black-backed gull is a scarce breeding species (Mitchell *et al.* 2004), so few colonies are available for monitoring. Numbers were stable on the Farne Islands (**north-east England**), where seven pairs again nested, and Rye Harbour and Dungeness (**south-east England**) each held one pair.

There was little change in numbers of great black-backed gull between 2004 and 2005 in **Wales**, where numbers increased on Skomer but decreased on nearby Middleholm and on Ramsey Island. No notable change occurred on Skokholm or Ynysoedd Gwylan or in the small colonies on Bardsey, South Stack and Valley Lakes, which held fewer than five pairs each. On the Skerries, Anglesey, numbers increased from 29 to 40 pairs since 2003. Welsh colonies were again more successful than most, as in 2004, with ≥ 1.00 chick per pair fledged at all sites .

Few other colonies were monitored in western regions. At Rockcliffe Marsh (**north-west England**), numbers decreased for the fourth successive year, to just 15 pairs, fewer than one-third of those in 2001, and productivity was below average at 0.53 chicks fledged per pair. Elsewhere in the region, 58 pairs were counted on the Calf of Man compared with 33 in 2002. In **south-west England**, small colonies were monitored at Ballard (where breeding success was high at 1.67 chicks fledged per nest) and Brownsea Island (one young fledged from three pairs). At Strangford Lough (**north-east Ireland**) following the crash which saw only one pair nest in 2001, moderate numbers were again present. Two pairs successfully nested on Copeland Island, with several other adults present that did not attempt to breed, but the single pair on Old Lighthouse Island failed. On Lambay (**south-east Ireland**), slightly fewer birds nested than in 2004 although the count of 132 pairs represents a decrease of 32% since 1999.

Table 3.16.3 Breeding success of great black-backed gull (chicks fledged per pair) 2004-2005 and 1986-2004 at selected colonies mentioned in the text. Figures in parentheses under 2004 and 2005 are the number of nests from which the estimates of success are derived.

Region/Site	2004	2005	1986-2004	
			Mean (\pm s.e.)	No. of years
NW Scotland				
Canna	0.27 (30)	0.13 (23)	0.79 (0.21)	8
Shetland				
Noss	-	≥ 0.48 (77)	0.69 (0.14)	4
Mousa	-	0.87 (15)	-	-
Orkney				
North Hill	0.62 (37)	0.42 (31)	0.94 (0.24)	3
N Scotland				
Nigg	0.00 (111)	0.00 (24)	1.47 (0.21)	14
SW England				
Ballard	1.83 (6)	1.67 (6)	1.37 (0.27)	4
Brownsea	0.00 (2)	0.33 (3)	0.50 (0.50)	2
Wales				
Skomer	1.60 (25)	1.40 (25)	1.28 (0.07)	9
Bardsey	2.33 (3)	2.33 (3)	1.78 (0.31)	8
Ynysoedd Gwylan	1.71 (47)	1.17 (48)	1.58 (0.10)	6
NW England				
Rockcliffe Marsh	-	0.53 (15)	0.71 (0.06)	4
NE Ireland				
Big Copeland Island	-	2.00 (2)	-	-
Old Lighthouse Island	-	0.00 (1)	-	-

3.17 Black-legged kittiwake *Rissa tridactyla*

There was no general geographical pattern to changes in breeding numbers between 2004 and 2005. A large increase was recorded in Wales, with smaller increases in NE and E England and NW Ireland. Decreases were noted in NW Scotland and, particularly, in SE England, where numbers fell by 93% since 1986. Breeding success was higher than in 2004, a year of very low success. Probably in response to an apparent food shortage early in the season, nest building was late at several colonies, after which an improvement in feeding conditions resulted in rapid nesting activity. However, in some areas food availability appeared to be low during chick rearing, with low success in NW Scotland and complete failure in N Scotland and NW England/Isle of Man.

Breeding numbers (Tables 3.17.1 and 3.17.2, Figure 3.17.1)

Black-legged kittiwakes may move between colonies and hence, year to year changes in numbers at sample colonies may not necessarily reflect larger scale regional population changes.

In **Shetland**, although overall numbers of AON in annual monitoring plots showed a small increase between 2004 and 2005 (possibly reflecting less non-breeding in 2005), whole-colony counts at three of the largest colonies in the region revealed further declines in recent years. On Fair Isle, numbers fell by 34%, from 8,204 to 5,399 AON since 2001, with notable large declines also occurring on Noss (-40%, to 1,433 AON since 2000) and at Hermaness (-37%, to 416 AON since 2002). On Foula, little change occurred since 2004, when 942 AON were recorded in early July; 898 AON were counted during the same period in 2005 (Gear 2005).

Table 3.17.1 Regional population changes at monitored black-legged kittiwake colonies, 2004-2005 (apparently occupied nests in late May or June) and 1986-2004 population trends. Trends for north-east Scotland are based on triennial monitoring at Troup/Lion's Head and Bullers of Buchan. Counts with a reported inaccuracy of > 5% and regional samples <300 AON are excluded. Average annual rates of change for 1986-2004 were calculated by regression of natural log of index against year (see section 1.2.2. for details). Statistical significance of trends (t-test) indicated as: n.s. not significant, ** P<0.01, ***P<0.001.

Region	2004	2005	2004-2005 % change	% annual change	
SW Scotland ^a	1,947	1,754	-9.9	+3.1***	1986-2004
NW Scotland ^b	2,048	1,546	-24.5	-1.9***	1986-2004
Shetland ^c	1,951	2,079	+6.6	-9.0***	1985-2005
NE Scotland ^d	1,010	985	-2.8	-2.9 n.s.	1986-2004
SE Scotland ^e	12,042	12,830	+6.5	-4.6***	1986-2004
NE England ^f	9,898	11,249	+13.6	-1.6 **	1986-2004
E England ^g	329	387	+17.6	-	
SE England ^h	348	177	-49.1	-8.1***	1986-2004
Wales ⁱ	3,335	4,588	+37.6	-1.9***	1986-2004
NW England ^j	976	1,055	+8.1	-0.9 n.s.	1986-2004
SE Ireland ^k	961	852	-11.3	+0.4 n.s.	1986-2004
NW Ireland ^l	895	1,032	+15.3	-	

Colonies: ^a Ceann a Mhara, Lunga, Colonsay, Mull of Galloway, Sanda; ^b Canna, Handa (productivity plots); ^c Sumburgh Head, Ness, Noss, Burra, Ramna Geo, Hermaness, Fair Isle (all productivity plots), Foula; ^d Covesea, Portknockie, Sands of Forvie NNR; ^e Isle of May, Inchkeith, Craigleith, The Lamb, Fidra, Inchcolm, Bass Rock, St. Abb's Head; ^f Farne Islands, Coquet Island, Huntcliff, Boulby Cliffs, Hartlepool; ^g Sizewell Riggs, Lowestoft; ^h Fan Bay-West Langdon Cliffs; ⁱ Great Orme, Little Orme, South Stack, Bardsey, Caldey, St Margaret's Island, Skomer, Eilegug Stacks; ^j St. Bee's Head; ^k Rockabill, Dunmore East, Portally; ^l Downpatrick Head.

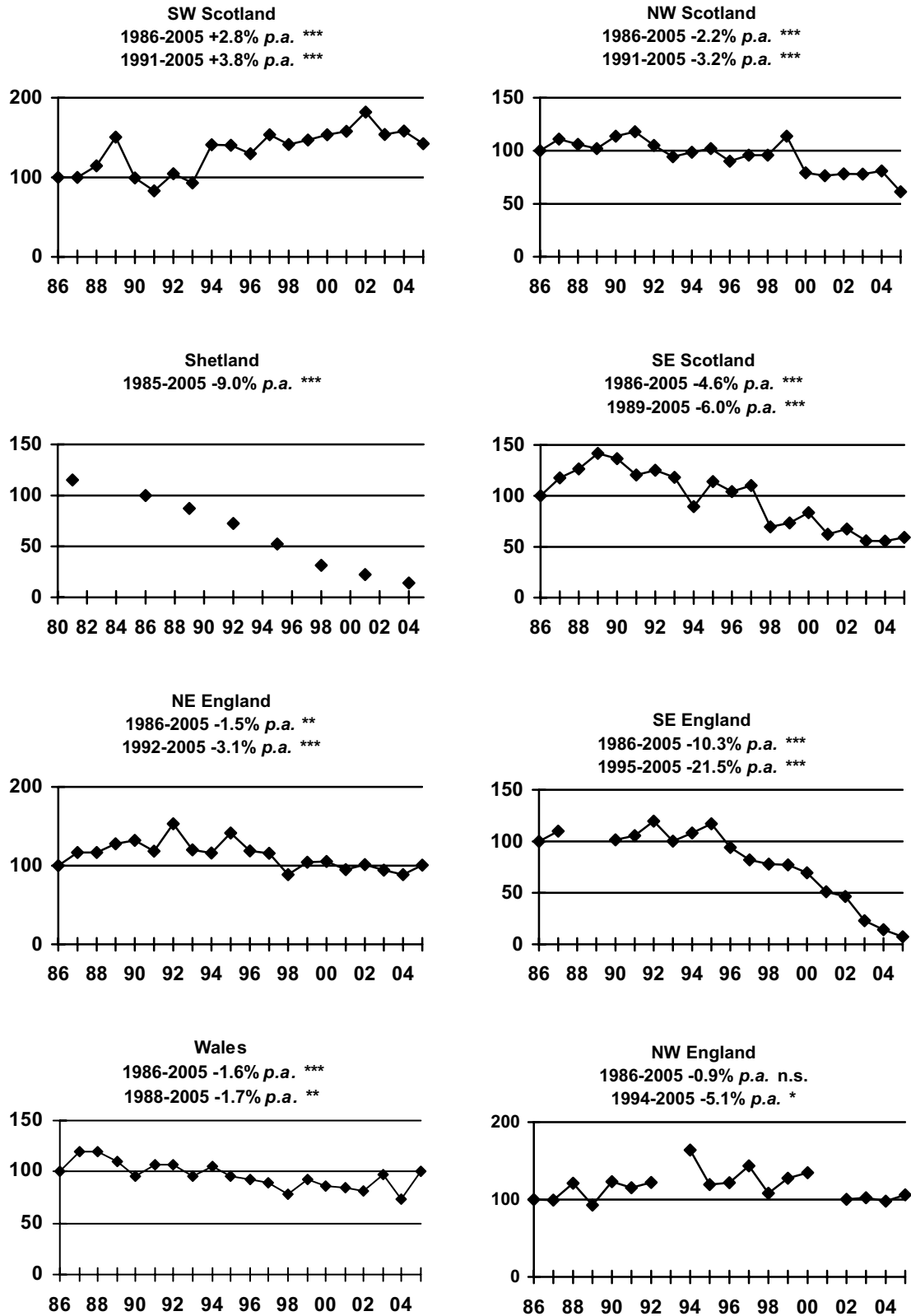


Figure 3.17.1 Regional population indices for breeding black-legged kittiwakes, 1986-2005 (apparently occupied nests in June). Average annual rates of change were calculated by regression of natural log of index against year (see section 1.2.2. for details). Statistical significance of trends (t-test) indicated as: n.s. not significant, ** P < 0.01, *** P < 0.001. For Shetland, chain indices are presented for 1981, then in three-year groups from 1985-1987 and plotted as the middle year of each group.

At these four Shetland colonies numbers in 2005 were between 10-30% of what they were in the late 1980s. It should be noted that because comprehensive coverage of kittiwake colonies across Shetland is achieved only within a three year period (not annually) indices are presented triennially for this region. The annual rate of decline for the region remains the highest in the UK and Ireland with overall numbers now barely 20% of what they were in the mid-1980s. A whole-colony count on Copinsay (**Orkney**) found just 433 AON compared with 4,256 AON in 1999. However, the colony was surveyed in mid-May in 2005 compared to mid-June in 1999 which could explain much, although probably not all, of the decline (Meek 2005).

In contrast to the situation further north numbers in sample plots at several colonies in Caithness (**north Scotland**) indicated a substantial increase between 1999 and 2005. The overall increase was 69% (to 3,543 AON) with the largest increases occurring at Iresgeo (114.6%, to 1,423 AON) and An Dun (61%, to 1,969 AON) (Swann 2005). Whether these sample data were representative of the colonies as a whole remains unknown. However, kittiwake numbers along the east Caithness coast were found to be remarkably stable between the two recent national surveys, a period during which numbers decreased in most counties in the UK and Ireland (Mitchell *et al.* 2004). Elsewhere in north Scotland, numbers at North Sutor changed little between 2004 and 2005.

Overall numbers in **north-east** and **south-east Scotland** were stable between 2004 and 2005; increases at Sands of Forvie and St. Abb's Head were largely balanced by proportionally similar decreases at Covesea and Bass Rock, where the count was the lowest on record. The trend in both regions has been downward since the early 1990s, although there are signs that numbers have stabilised in the latter region in recent years.

Proportional increases of between 13-18% were recorded in **north-east** and **east England**. Between 2004 and 2005 substantial increases were noted at Huntcliff, Hartlepool and on Coquet with smaller increases at Boulby Cliffs, Lowestoft and Sizewell Rigs. At the last site, the colony, although small, has increased steadily since colonisation in the early 1990s but the rigs are to be removed within three years with the decommissioning of Sizewell A power station (A. Miller, pers. comm.). To the south of these regions in **south-east England** colonies of black-legged kittiwakes continued to decline. All monitored colonies were situated at South Foreland, where decreases occurred annually since 1995 with those between 2004 and 2005 estimated at 49%; the regional population index in 2005 was just 7% of that in 1986.

Small to moderate decreases were recorded in **north-west** and **south-west Scotland** between 2004 and 2005. Whole-colony counts revealed notable decreases on Canna and Lunga, the lowest counts since 1996 and 1999, respectively, with smaller reductions in numbers in sample plots on Handa and Colonsay, which were the lowest counts at both colonies since 1998. In contrast, numbers at Mull of Galloway increased by 44% to 306 AON and the population on Tiree at Ceann a Mhara appeared to be stable. At the remote colony of North Rona a substantial decline of 48% was found to have occurred since 2001, numbers falling from 3,498 to 1,837 AON. Another remote colony, on Haskeir, saw a small increase from 283 to 305 AON since 2002. The long-term trends in each region have differed somewhat since the early 1990s, with a highly significant increase detected in the south-west (although with a decline most recently), but a significant decrease in the north-west.

Table 3.17.2 Population changes of black-legged kittiwake 2004-2005 and 1986-2004 at selected sites referred to in the text. Figures refer to the number of apparently occupied nests.

Region/Site	2004	2005	2004-2005 % change	1986-2004	
				Mean (\pm s.d.)	No. of years
Shetland					
Foula	942	898	-4.7	2,335 (1,200)	10
Fair Isle (plots)	273	391	+43.2	940 (358)	18
SW Scotland					
Mull of Galloway	212	306	+44.3	307 (69)	18
Lunga	909	604	-33.6	793 (154)	12
Ceann a Mhara	697	724	+3.9	869 (125)	6
Colonsay (plots)	108	95	-13.9	101 (20)	10
NW Scotland					
Canna	1,340	968	-27.8	1,018 (213)	19
Handa (plots)	708	578	-18.4	731 (42)	7
N Scotland					
North Sutor	214	230	+7.5	519 (231)	10
NE Scotland					
Covesea	397	302	-23.9	307 (111)	15
Portknockie	162	158	-2.5	80 (41)	17
Sands of Forvie	242	313	+29.3	684 (255)	17
SE Scotland					
Isle of May	3,876	3,790	-2.2	5,639 (1,666)	19
Firth of Forth islands	1,267	1,238	-2.3	1,553 (407)	11
Bass Rock	660	563	-14.7	1,488 (919)	8
St. Abb's Head	6,239	7,239	+16.0	12,737 (3,867)	19
NE England					
Farne Islands	5,151	5,376	+4.4	5,692 (549)	19
Coquet Island	85	127	+49.4	61 (21)	11
Huntcliff	1,925	2,725	+41.6	3,994 (1,244)	18
Boulby Cliffs	2,650	2,900	+9.4	3,456 (824)	19
Hartlepool	87	121	+39.1	82 (42)	4
E England					
Sizewell Rigs	214	255	+19.2	-	-
Lowestoft	115	132	+14.8	145 (49)	18
SE England					
South Foreland	348	177	-49.1	1,981 (768)	17
SW England					
Blacker's Hole	51	66	+29.4	59 (19)	14
Berry Head	20	80	+300.0	23 (14)	7
Wales					
Caldey	34	84	+147.1	16 (17)	7
Ramsey Island	137	228	+66.4	381 (106)	10
St. Margaret's Island	87	179	+105.7	138 (126)	14
Skomer	1,570	2,281	+45.3	2,241 (249)	19
Bardsey	358	365	+2.0	246 (55)	19
Great Ormes Head	720	814	+13.1	1,099 (269)	16
Little Ormes head	387	577	+49.1	668 (128)	16
NW England					
St. Bee's Head	976	1,055	+8.1	1,167 (185)	17
NE Ireland					
Isle of Muck	227	256	+12.8	347 (238)	6
SE Ireland					
Rockabill	155	178	+14.8	115 (48)	11
Dunmore	755	634	-16.0	922 (129)	19
Portally	51	40	-18.0	63 (37)	18
NW Ireland					
Downpatrick Head	895	1,032	+15.3	883 (162)	4

In most regions bordering the Irish Sea numbers generally increased between 2004 and 2005. In **Wales**, although a 38% increase was recorded overall, with numbers at most colonies rising by 10% or more, these increases were largely in the context of a return to numbers recorded in 2003, after the decline noted in 2004. Non-breeding may have depressed numbers in 2004 although the number of nests in plots varied little between 2003 (1,358 nests) and 2004 (1,343) but an increase was evident for 2005 (1,427). On Skomer, an increase of 46% was noted, but numbers were still less than in 2003 (*cf.* 2,324 AON). The situation on Ramsey (*cf.* 307 AON in 2003) and at Great Orme and Little Orme was similar (*cf.* 994 and 617 AON respectively in 2002 - neither colony was monitored in 2003). However, on Bardsey and Caldey numbers have never been higher in the period since 1986, and on St. Margaret's Island numbers in 2005 were at their highest since 1988. Despite recent increases, the regional population trend for Wales was downward, showing a highly significant rate of decline. In **north-west England**, where the population index was remarkably stable since 2002, a minimal increase between 2004 and 2005 was recorded. The small colonies at Blackers Hole and Berry Head (**south-west England**) both increased, by a factor of four at the latter site.

In Ireland, where few colonies are monitored annually, increases were noted on the Isle of Muck (**north-east Ireland**) and at Downpatrick Head (**north-west Ireland**); as noted for some Welsh colonies the increase at the latter site represented a return to 2003 colony size. In **south-east Ireland**, the number at Dunmore was the lowest since the SMP began, but at Rockabill a new high was recorded. Despite a decrease recorded at Portally between 2004 and 2005 numbers there were still higher than in all other years since 1995.

Breeding success (Tables 3.17.3 and 3.17.4, Figure 3.17.2)

The overall productivity of black-legged kittiwakes in Britain and Ireland in 2005 averaged 0.59 (s.e. ± 0.05) chicks fledged per breeding pair, from 41 colonies: below the mean for the period 1986-2004 of 0.69 (s.e. ± 0.03) recorded at between 30 and 61 colonies annually. A comparison of 40 colonies monitored in both 2004 and 2005 found success increased significantly by 0.26 (s.e. ± 0.06) chicks per pair. As usual, these productivity estimates contain marked regional variation.

Mean productivity in **Shetland** in 2005 was 0.64 chicks per AON, significantly higher than that recorded in 2004 and the highest recorded in the region since 1999. More chicks were fledged at all colonies studied although only at Sumburgh Head was success greater than one chick per AON and success on Foula was still far lower than at other sites. Nest building and laying was earlier than in 2003 and 2004 but still regarded as late, with concerted activity noted at the end of May and early June, possibly in response to an improvement in food availability. The number of nests in plots increased in most colonies, especially on Fair Isle where 43% more nests were built. In SOTEAG monitoring plots and at Hermaness, hatching success and parental attendance was high (Heubeck 2005; Thomas 2005) and chick losses were low in the SOTEAG plots (Heubeck 2005).

After the complete failure recorded in **Orkney** in 2004, kittiwakes had a more successful year in 2005 although productivity was still below average at all colonies. Furthermore, the years 2003-2005 have been the three poorest breeding seasons in the region since 1986, with the next lowest value, 0.74 chicks fledged per AON, in 1999. As had been reported in Shetland the breeding season was later than usual, by as much as 2-3 weeks, with breeding activity noted as food presumably became available. However, in some areas food availability thereafter apparently diminished, leaving birds struggling to fledge young; breeding success was especially low on Rousay and Papa Westray in 2005. In contrast to Shetland, the number of nests in study plots fell at all sites in Orkney, except Rousay.

In **north Scotland**, complete failure was recorded at North Sutor for the second successive year, although in 2003 birds were only marginally more successful at this site (0.18 chicks fledged per AON). A shortage of available sandeels was suspected as the cause of failure, as many other seabird species at this colony had low levels of success, failed completely or, in the case of terns, did not even attempt to breed in 2005.

Table 3.17.3 Black-legged kittiwake breeding success, 2004-2005, grouped regionally: estimated number of chicks fledged per occupied, well-built nest at sample colonies (superscript n = number of colonies). Figures are presented as the mean and standard error of the average number of chicks fledged per nest for individual colonies. Changes in breeding success are indicated for colonies studied in both years (significant changes, as indicated by t-test: *P<0.05, **P<0.01, ***P<0.001).

Region	2004 chicks fledged/nest				2005 chicks fledged/nest				2004-2005 change	
	Nests ⁿ	Range	Mean	±s.e.	Nests ⁿ	Range	Mean	±s.e.	Mean ⁿ	±s.e.
SW Scotland ^a	141 ¹	-	0.65	-	140 ¹	-	0.64	-	-0.01 ¹	-
NW Scotland ^b	1,216 ³	0.37-1.11	0.76	±0.21	973 ³	0.00-0.32	0.18	±0.09	-0.58 ³	±0.27
Shetland ^c	1,118 ⁸	0.00-0.70	0.15	±0.09	1,284 ⁸	0.26-1.18	0.64	±0.11	+0.49 ⁸	±0.11**
Orkney ^d	934 ⁷	0.00-0.04	<0.01	±0.01	740 ⁷	0.04-0.76	0.56	±0.11	+0.55 ⁷	±0.11**
N Scotland ^e	47 ¹	-	0.00	-	73 ¹	-	0.00	-	0.00 ¹	-
NE Scotland ^f	787 ³	0.29-0.83	0.61	±0.16	723 ³	0.53-1.08	0.83	±0.16	+0.22 ³	±0.09
SE Scotland ^g	1,222 ³	0.27-0.57	0.37	±0.10	1,327 ³	0.79-0.96	0.88	±0.05	+0.51 ³	±0.06*
NE England ^h	1,347 ⁵	0.10-1.11	0.47	±0.19	1,095 ⁴	0.52-1.08	0.73	±0.12	+0.25 ³	±0.16
E England ¹	115 ¹	-	0.70	-	132 ¹	-	0.73	-	+0.03 ¹	-
SW England ^j	51 ¹	-	0.74	-	-	-	-	-	-	-
NW Eng. /I. of Man ^k	30 ¹	-	0.00	-	21 ¹	-	0.00	-	0.00 ¹	-
Wales ^l	1,429 ⁵	0.07-0.60	0.33	±0.12	1,547 ⁵	0.17-1.01	0.55	±0.15	+0.23 ⁵	±0.17
NE Ireland ^m	257 ²	0.64-0.88	0.76	±0.12	88 ¹	-	0.46	-	-0.30 ¹	-
SE Ireland ⁿ	1,188 ³	0.15-0.94	0.49	±0.23	838 ²	0.05-0.99	0.52	±0.47	+0.25 ²	±0.35
NW Ireland ^o	895 ¹	-	1.09	-	1,032 ¹	-	0.89	-	-0.20 ¹	-
Total	10,777 ⁴⁵	0.00-1.11	0.37	±0.05	10,013 ⁴¹	0.00-1.18	0.59	±0.05	+0.26⁴⁰	±0.06***

Colonies: ^a Ailsa Craig; ^b Canna, Handa, St. Kilda; ^c Noness, Hermaness, Burray, Foula, Noss, Ramna Geo, Sumburgh Head, Fair Isle; ^d Papa Westray, Rousay, Marwick Head, Row Head, Mull Head, Gultak, Costa Head; ^e North Sutor; ^f Bullers of Buchan, Sands of Forvie, Fowlsheugh; ^g Isle of May, Dunbar, St. Abb's Head; ^h Farne Islands, Coquet Island, Gateshead (2004 only), Marsden Cliffs (2005 only), Saltburn, Bempton; ⁱ Lowestoft; ^j Durlston Head-St Albans Head (2004 only); ^k Peel Hill; ^l Bardsey, Elegug Stacks, Skomer, Ramsey Island, Great Orme; ^m Isle of Muck, Rathlin (2004 only); ⁿ Dunmore, Ram Head, Rockabill (2004 only); ^o Downpatrick Head.

Further south, in **north-east** and **south-east Scotland**, kittiwakes were also more successful than in 2004, significantly so in the latter region, although in neither was the fledging rate in 2004 as low as that in Orkney and Shetland. Breeding success was higher than the long-term means at all colonies, but only marginally so at Dunbar; at Buller's of Buchan it was the most successful year since 1989. Timing of breeding on the Isle of May was the latest ever recorded, with the first egg seen on 30 May. Unfavourable conditions early in the season improved markedly from mid-June when 0-group sandeels, thought to be essential for the rearing of chicks, apparently became available (Harris *et al.* 2005). Subsequently, mean success at 0.83 chicks fledged per nest was similar to that recorded in the late 1980s, i.e. prior to the start of the sandeel fishery. All (116) food samples collected during the chick-rearing period contained sandeels, with 0-group fish predominating, at 88% by mass; the remainder mostly comprised of older sandeels (4%) and clupeids (8%).

In **north-east England**, mean success was also higher than in 2004, although regionally and at individual colonies, breeding success in 2005 was still lower than in most years since 1997/98. Apparent food availability problems during the breeding season, and also during the late winter/early spring (when birds attain breeding condition) were again thought to be the primary cause (Walton *et al.* 2005). At Lowestoft (**east England**), success was similar to that of 2004, which was the least successful year at the colony since 1989.

Breeding success in **north-west Scotland**, where colonies were relatively successful in 2004, was extremely low in 2005; as at many colonies in eastern regions, late breeding and food shortage were noted as features of the season. Complete failure was recorded on Canna for the first time, with success on Handa also the lowest on record. The number of nests in study plots decreased at both colonies, also on St. Kilda, where success was marginally lower than in 2004. On Ailsa Craig (**south-**

west Scotland) kittiwakes were more successful than colonies in the north-west, with success and the number of nests in plots similar to 2004.

Table 3.17.4 Breeding success of black-legged kittiwake (fledglings/AON) 2004-2005 and 1986-2004 at selected colonies mentioned in the text. Figures in parentheses under 2004 and 2005 are the number of nests from which the estimates of success were derived.

Region/site	2004	2005	1986-2004	
			Mean (\pm s.e.)	No. of years
SW Scotland				
Ailsa Craig	0.65 (141)	0.64 (140)	0.49 (0.08)	18
NW Scotland				
Handa	1.11 (697)	0.22 (561)	1.27 (0.06)	18
Canna	0.80 (331)	0.00 (244)	0.68 (0.06)	19
St. Kilda	0.37 (188)	0.32 (168)	0.44 (0.05)	18
Shetland				
Noness	0.00 (39)	0.73 (26)	0.33 (0.14)	9
Hermaness	0.14 (128)	0.44 (126)	0.39 (0.09)	16
Foula	0.00 (109)	0.26 (103)	0.58 (0.10)	18
Noss	0.02 (340)	0.45 (360)	0.25 (0.05)	19
Ramna Geo	0.35 (74)	0.67 (92)	0.45 (0.11)	12
Burravoe	0.70 (48)	0.99 (71)	0.70 (-)	1
Sumburgh Head	0.01 (105)	1.18 (115)	0.45 (0.11)	19
Fair Isle	0.00 (275)	0.41 (391)	0.68 (0.12)	19
Orkney				
Mull Head	0.00 (122)	0.73 (97)	1.03 (0.07)	19
Papa Westray	0.00 (94)	0.04 (82)	0.74 (0.11)	16
Rousay	0.04 (67)	0.28 (83)	0.78 (0.10)	16
Costa Head	0.00 (193)	0.69 (172)	0.98 (0.12)	12
Gultak	0.00 (97)	0.71 (57)	0.83 (0.07)	19
Marwick Head	0.00 (157)	0.76 (130)	1.03 (0.07)	19
Row Head	0.00 (204)	0.69 (119)	0.99 (0.07)	19
N Scotland				
North Sutor	0.00 (47)	0.00 (73)	0.63 (0.09)	15
NE Scotland				
Bullers of Buchan	0.71 (320)	1.08 (235)	0.57 (0.09)	15
Sands of Forvie	0.29 (80)	0.53 (121)	0.43 (0.09)	15
Fowlsheugh	0.83 (387)	0.89 (367)	0.71 (0.09)	17
SE Scotland				
Isle of May	0.27 (476)	0.79 (587)	0.55 (0.09)	19
Dunbar	0.57 (586)	0.96 (542)	0.92 (0.08)	18
St. Abb's Head	0.27 (160)	0.88 (193)	0.68 (0.07)	18
NE England				
Coquet Island	1.11 (85)	1.08 (127)	1.10 (0.08)	12
Farnes	0.10 (551)	0.63 (590)	0.87 (0.08)	18
Marsden Cliffs	-	0.69 (131)	-	-
Saltburn	0.26 (130)	0.52 (247)	0.82 (0.07)	19
E England				
Lowestoft	0.70 (115)	0.73 (132)	1.06 (0.06)	19
Wales				
Bardsey	0.60 (358)	0.55 (365)	0.74 (0.11)	17
Ramsey Island	0.00 (86)	0.73 (120)	0.59 (0.16)	7
Elegug Stacks	0.07 (38)	0.17 (48)	0.30 (0.07)	14
Skomer	0.47 (807)	1.01 (879)	0.67 (0.05)	19
Great Ormes Head	\leq 0.49 (140)	0.31 (135)	0.54 (0.06)	16

Table 3.17.4 (cont.)

Region/site	2004	2005	1986-2004	
			Mean (\pm s.e.)	No. of years
Isle of Man				
Peel Hill	0.00 (30)	0.00 (21)	0.33 (0.12)	9
NE Ireland				
Isle of Muck	0.64 (80)	0.46 (88)	0.96 (0.17)	3
SE Ireland				
Dunmore	0.39 (755)	0.99 (634)	0.65 (0.04)	19
Ram Head	0.15 (278)	0.05 (204)	0.49 (0.07)	12
NW Ireland				
Downpatrick Head	\leq 1.09 (895)	0.89 (1,032)	0.94 (0.11)	3

At Peel Hill (**Isle of Man**) complete failure was recorded, for the second consecutive year; all nests appeared to have failed at the egg stage (Moore 2005). In other regions around the Irish Sea success was variable, although no colony performed as poorly as Peel Hill. In **Wales**, mean breeding success, at 0.55 chicks fledged per AON, was higher than in 2004 but a fair degree of variation existed between colonies. At Elegug Stacks success was low for the fourth successive year and at Great Ormes Head it was the least successful year for kittiwakes since 1989. On Bardsey, where fledging rate has rarely fallen below 1 chick per AON in the last decade, it was again a poor year. On Ramsey, where complete failure has occurred in two of the previous four years, birds had an above average breeding season in 2005. It was the most successful year on record on Skomer, where success was 1.01 chicks per AON. Interestingly, the most successful sub-colony, where the fledging rate was 1.31, was close to a successful peregrine *Falco peregrinus* nest (Brown and Morgan 2005).

In **north-east Ireland**, fledging success at the normally productive colony on the Isle of Muck was well below average, although few years of data have been collected. Two colonies in **south-east Ireland** had mixed success: at Dunmore, it was the most successful season since 1999 but at Ram Head success was the lowest since monitoring began. At Downpatrick Head (**north-west Ireland**), the kittiwake colony has been rather productive in the few years that data has been received. Success in 2005 was slightly lower than in 2004 and close to the site mean.

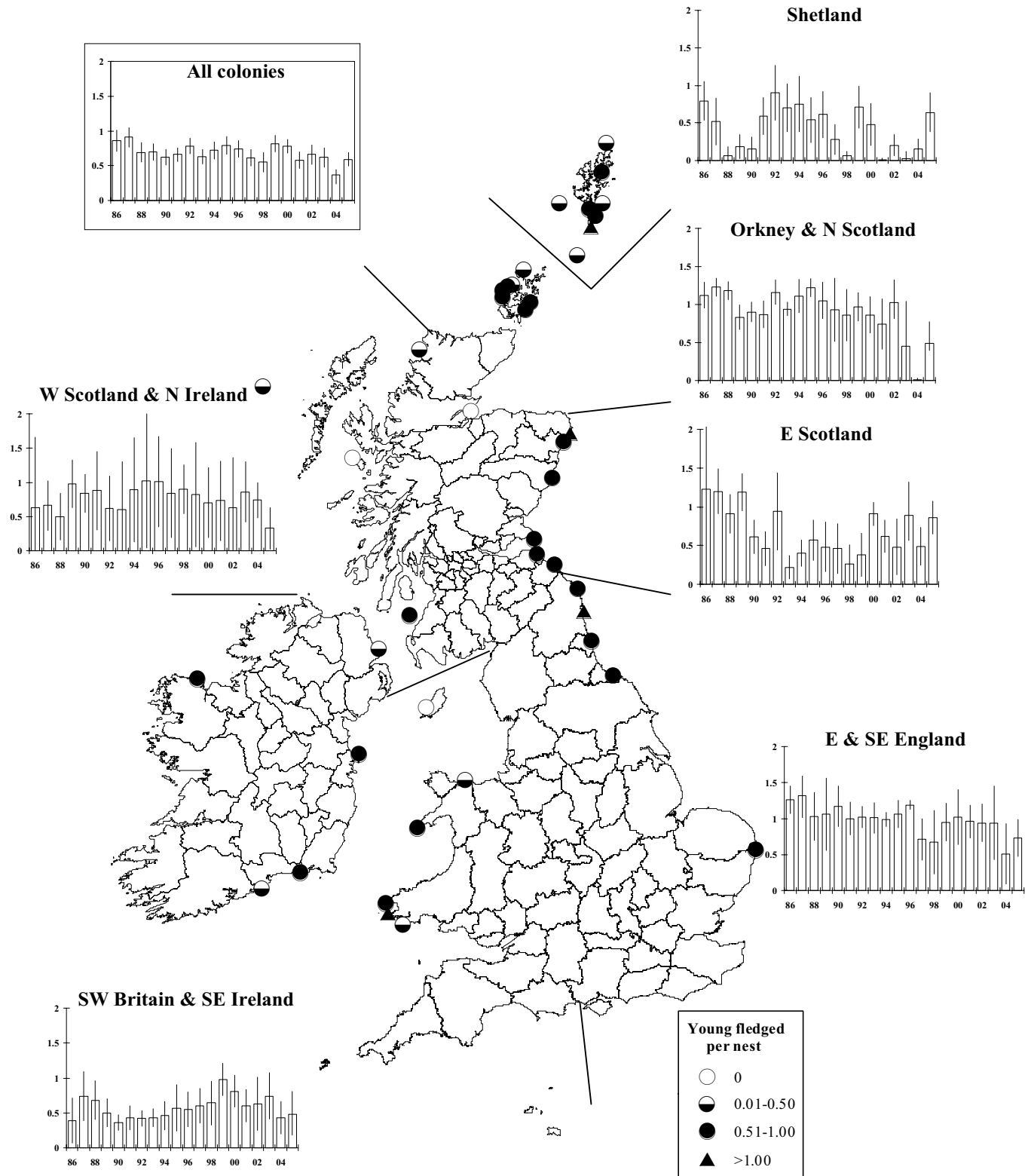


Figure 3.17.2 Breeding performance (chicks fledged per well-built nest) at black-legged kittiwake colonies during 1986-2005, showing regional and annual variation. Symbols on map represent 2005 data for individual colonies; histograms show annual averages (with 95% confidence limits) for the regions indicated. A histogram for SW and NW Ireland where only one colony was monitored in 2002-2005 has been omitted.

3.18 Sandwich tern *Sterna sandvicensis*

Between 2004 and 2005, there was little change in overall numbers at sampled colonies in Britain and Ireland. Declines in Wales were offset by increases in NE Ireland, and those in Scotland were compensated by increases in E England. Sandwich terns were generally productive in 2005, with the exception of those nesting in Scotland.

Breeding numbers (Tables 3.18.1 and 3.18.2)

A small new colony of at least 18 pairs established on Lamb Holm, **Orkney** (Meek 2005).

The number at the Sands of Forvie (**north-east Scotland**) declined by almost a third from 2004 to the lowest total for five years. In 2005, Sandwich terns did not breed on the Isle of May (**south-east Scotland**) but, for the first time in six years, three pairs nested at a site in the Firth of Forth.

Table 3.18.1 Regional population changes (breeding pairs) at monitored Sandwich tern colonies, 2004–2005. Superscript = number of colonies counted in both years. Note that British and Irish totals are for the sample of monitored colonies in that year only and not the entire population.

Region	2004	2005	2004-2005 % change
NE Scotland	833	571	-31.5 ³
SE Scotland	151	3	-98.0 ²
NE England	3,011	3,163	+5.1 ³
E England	3,080	3,553	+15.4 ⁴
SE England	1,222	1,179	-3.5 ⁶
SW England	212	249	+17.5 ²
NW England	420	300	-28.6 ¹
Wales	1,563	1,155	-26.1 ¹
NE Ireland	2,345	3,005	+28.1 ³
NW Ireland	564	575	+1.9 ³
SE Ireland	1,161	1,122	-3.4 ¹
Britain and Ireland	14,562	14,872	+2.1 ²⁹

Although the colonies on Coquet and the Farne Islands (**north-east England**) recovered slightly from the previous years' decline, overall numbers in this region were still the second lowest for 27 years.

In 2005, Sandwich terns in **east England** were concentrated at the two main colonies of Blakeney and Scolt Head. Numbers in this region increased from the 18-year low in 2004 by 15% but remained below the 1986–2004 mean of 3,741 pairs (s.d. \pm 535).

In **south-east England**, overall numbers decreased only marginally from 2005, by 3%. The number at Langstone Harbour increased to its highest level since re-colonisation of the site in 1996, and the colony at Burntwick Island reached a record high number since monitoring began there in 1998. However, no Sandwich terns settled at North Solent, and Chichester Harbour was unoccupied for the third consecutive year. The Rye Harbour colony declined by a third, although it remained well above the 19-year mean of 72 pairs (s.d. \pm 90). The colony at Pitt's Deep – Hurst increased from around eight pairs in 2004 to 76 pairs in 2005.

Table 3.18.2 Population changes of Sandwich tern breeding pairs 2004-2005 and 1986-2004 at selected sites referred to in the text in Britain and Ireland.

Region/Site	2004	2005	2004-2005 % change	1986-2004	
				Mean (\pm s.d.)	No. years
NE Scotland					
Sands of Forvie	833	570	-31.6	543 (445)	18
SE Scotland					
Isle of May	151	3	-98.0	160 (182)	7
NE England					
Coquet	1,158	1,250	+7.9	1,518 (285)	19
Farne Islands	1,853	1,913	+3.2	2,382 (584)	19
E England					
Scolt Head	1,800	c.1,900	c.+5.6	1,628 (1,333)	19
Holkham	18	0	-100.0	322 (335)	4
Blakeney	1,260	1,650	+30.9	1,968 (1,250)	19
Havergate	2	3	+50.0	78 (91)	19
SE England					
Burntwick Island	602	632	+5.0	277 (198)	6
Rye Harbour	300	200	-33.3	72 (90)	19
Chichester Harbour	0	0	0.0	10 (14)	19
Langstone Harbour	172	271	+57.6	43 (60)	19
North Solent NR	c.140	0	-100.0	176 (73)	19
Pitts Deep - Hurst	c.8	76	+850.0	56 (54)	15
SW England					
Brownsea	211	248	+17.5	101 (61)	19
Wales					
Anglesey	1,563	1,155	-26.1	675 (312)	19
NW England					
Hodbarrow	420	300	-28.6	272 (156)	16
NW Ireland					
Lower Lough Erne	105	156	+48.6	54 (24)	19
Lough Swilly	242	340	+40.5	167 (72)	19
Mulroy Bay	217	79	-63.6	81 (84)	19
NE Ireland					
Green Is., Carlingford	795	1,125	+41.5	477 (355)	19
Larne Lough	573	788	+37.5	244 (162)	19
Strangford Lough	977	1,092	+11.8	992 (522)	19
SE Ireland					
Lady's Island Lake	1,161	1,122	-3.4	1,083 (294)	19

There were 248 pairs of Sandwich terns on Brownsea Island in 2005 (**south-west England**); the highest number recorded at this site. As in the previous two years, one pair was recorded on the Isles of Scilly.

Following record high levels in 2004, numbers at Anglesey (**Wales**) declined by 26%, but remained well above the 19-year mean of 675 pairs (s.d. \pm 312).

At Hodbarrow (**north-west England**), numbers declined to their lowest level since 1997, after a record high in 2004.

In contrast, Sandwich terns in **north-east Ireland** continued to increase, reaching a record high level of 3,005 pairs. Whilst numbers at Strangford Lough increased moderately (12%) from 2004, the colony at Larne Lough reached its highest level on record and that at Green Island, Carlingford, the second highest since 1986. Overall numbers at sampled colonies in **north-west Ireland** also reached record high levels. A substantial decline, of 64%, at Mulroy

Bay was compensated by increases at Lower Lough Erne and Loch Swilly of 49% and 41%, respectively. Between 2004 and 2005, a small decline occurred at Lady's Island Lake in **south-east Ireland**, but numbers remained above the colony average.

Breeding success (Tables 3.18.3 and 3.18.4)

The overall productivity at 17 sampled colonies in the UK and Ireland was 0.69 chicks per pair; above that of 2004, but slightly below the long-term mean of 0.71 (s.e. ± 0.04) recorded at six to twenty colonies monitored annually from 1986-2004.

At the new colony at Lamb Holm (**Orkney**), 12 chicks were ringed, but only one fledged, from 18 pairs (Meek 2005).

At the Sands of Forvie (**north-east Scotland**), a presumed shortage of sandeels occurred during the main chick hatching period, resulting in only 22 fledged young from 570 pairs: the lowest productivity for this site since 1998 (Drysdale 2005). One chick fledged from three pairs at a site in the Forth (**south-east Scotland**).

Periods of bad weather and of presumed food shortages depressed breeding success at the two main colonies in **north-east England**, although the effects were not as severe as in 2004 (S. Lowe, pers. comm.). On Coquet, productivity was 0.46 chicks per pair: the highest for four years, but below the 2005 national average of 0.69. Productivity of this species was not monitored on the Farne Islands, but it was thought that despite the adverse weather and probable food shortages fledging success was high (Walton *et al.* 2005).

In **east England**, breeding success was considerably higher than in 2004 and productivity was close to the 1986-2004 mean for this region (0.74 chicks per pair, s.e. ± 0.07). Productivity at Scolt Head was above the colony mean, at *c.* 0.87 chicks per pair, whilst predation depressed productivity at Blakeney to below average.

In **south-east England**, productivity was similar to that in 2004, at 0.77 chicks per pair, although data were received from only two sites. A food shortage was noted at Langstone Harbour, when prey items were noticeably large early in season. This, combined with bad weather in mid July, resulted in productivity being half the long-term colony mean (C. Cockburn, pers. comm.). In contrast, productivity at Rye Harbour was the highest ever recorded for this site. There were no count data available from Burntwick Island, but it was thought to have been a successful season there (M. Ellison, pers. comm.).

On Brownsea Island (**south-west England**), almost one third of clutches were lost to trampling by a great cormorant roost during mid-June, resulting in a lower than average productivity of 0.46 chicks per pair (C. Thain, pers. comm.). One pair nested unsuccessfully on the Isles of Scilly.

An estimated 1,140 young fledged from 1,155 pairs at the colony in Anglesey (**Wales**), which was similar to that in 2004. Productivity at Hodbarrow (**north-west England**) was 0.67 chicks per pair; slightly lower than in 2004, but well above the 15-year mean.

In **north-west Ireland**, at least 45 chicks fledged at Lower Lough Erne, but the final outcome was unknown. At Lough Swilly, productivity was lower than in 2004 due to flooding. Mink predation depressed productivity at Mulroy Bay to below half the long-term average (Speer and Perry 2005). No productivity figures were available from the colonies in **north-east Ireland**, although it was thought that Sandwich tern productivity at Larne Lough Islands was high (M. Tickner, pers. comm.). At Lady's Island Lake (**south-east Ireland**), productivity was 0.91 chicks per pair, lower than in 2004.

Table 3.18.3 Sandwich tern productivity, 2004–2005, grouped regionally: expressed as number of chicks fledged per breeding pair at sample colonies (superscript n = number of colonies). When more than one colony was sampled in a given region, the overall figure given is the total number of fledglings divided by the total number of breeding pairs across all colonies. Note that the same colonies have not necessarily been monitored in each region each year and that the numbers of pairs given here are sample sizes (and do not necessarily indicate population changes between years).

Region	2004 chicks fledged/pair			2005 chicks fledged/pair		
	Pairs ⁿ	Range	Overall	Pairs ⁿ	Range	Overall
NE Scotland	833 ¹	-	0.25-0.84	571 ²	0.00-0.04	0.04
SE Scotland	151 ¹	-	0.03	3 ¹	-	0.33
NE England	1,158 ¹	-	0.24	1,250 ¹	-	0.46
E England	3,080 ⁴	0.00-1.50	0.30	3,553 ⁴	0.00-0.87	0.72
SE England	620 ⁴	0.00-1.33	c.0.79	471 ²	0.23-1.50	c.0.77
SW England	212 ²	0.00-0.86	0.85	249 ²	0.00-0.46	0.46
Wales	1,563 ¹	-	1.02	1,155 ¹	-	0.99
NW England	420 ¹	-	0.71	300 ¹	-	0.67
NW Ireland	459 ²	0.86-1.09	<0.99	419 ²	0.41-0.84	0.76
SE Ireland	1,161 ¹	-	1.21	1,122 ¹	-	0.91
Total	9,657 ¹⁸	0.00-1.50	c.0.63	9,093 ¹⁷	0.00-1.50	0.69

Table 3.18.4 Productivity of Sandwich terns expressed as chicks per pair 2004–2005 and 1986–2004 at selected sites referred to in the text.

Region/site	2004	2005	1986–2004	
			Mean (\pm s.e.)	No. of years
NE Scotland				
Sands of Forvie	>0.25	0.04	0.59 (0.12)	15
NE England				
Coquet	0.27	0.46	0.62 (0.07)	13
E England				
Scolt Head	0.35	c.0.87	0.68 (0.11)	15
Blakeney	0.24	0.55	0.70 (0.08)	15
Havergate	1.50	0	0.74 (0.14)	14
SE England				
Rye Harbour	1.33	1.50	0.50 (0.15)	14
Langstone Harbour	0.52	0.23	0.50 (0.11)	8
SW England				
Brownsea	0.86	0.46	0.68 (0.09)	14
Wales				
Anglesey	1.02	0.99	0.86 (0.08)	14
NW England				
Hodbarrow	0.71	0.67	0.47 (0.13)	15
NW Ireland				
Lough Swilly	1.09	0.84	1.05 (0.07)	19
Mulroy Bay	0.86	0.41	1.06 (0.12)	12
SE Ireland				
Lady's Island Lake	1.21	0.91	0.78 (0.12)	6

3.19 Roseate tern *Sterna dougallii*

Numbers of breeding roseate terns remained broadly stable between 2004 and 2005, as a small decline at Rockabill was offset by increases at Coquet and Lady's Island Lake. Overall, productivity was high; similar to that in 2004.

Breeding numbers (Table 3.19.1)

Table 3.19.1 Roseate tern numbers (breeding pairs) at most colonies in Britain and Ireland 1994–2005. (- indicates that no data were available)

Region/ Site	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2004-2005 % change
E Scotland													
Inchmickery	2	0	0	0	0	0	0	0	0	0	0	0	
Forth B	7	11	7	8	8	9	10-11	1	2	8	4	4	0.0
Forth C	-	1	1	0	0	0	1	1	0	0	0	0	
New colony	0	0	0	0	0	0	1	0	0	0	0	0	
NE England													
Farne Islands	2-3	2	2	3	3	4	1	1	1	0	0	1	
Coquet Island	c38	38	24	25	29	34	34	42	57	70	73	91	+24.7
New colony A	0	1	14	2	3	0	0	0	0	0	0	0	
New colony B	0	0	0	0	0	0	0	0	1	0	0	0	
Wales													
Anglesey A	18	10	1	2	3	3	2	7	7	0	0	0	
Anglesey B	0	0	0	1	0	0	0	0	0	0	0	0	
Anglesey C	2	0	0	0	2-3	0	0	0	0	2	0	0	
NE Ireland													
Larne Lough	4	7	13	7	3	10	4	6	4	19	8	7	-12.5
Carlingford L.	0	0	0	2	0	0	0	0	0	0	0	0	
SE Ireland													
Rockabill	394	554	557	602	578	611	618	605	588	638	677	657	-2.9
Lady's Island	140	60	120	48	80	116	>78	46	96	77	66	74	+12.1
Colony C	0	0	0	0	0	0	0	0	0	5	12	2	-83.3
Total*	614	686	744	703	712	788	>750	709	758	821	c842	837	-0.6

(* includes pairs noted at other sites in the UK and Republic of Ireland.)

Numbers of roseate terns in Britain and Ireland remained stable in 2005 after three years of increase. Between 2004 and 2005, numbers in the UK increased by 19% from 87 to 104 pairs: their highest level since 1990.

After two years of increase, a small decline occurred at Rockabill (**south-east Ireland**), by far the largest colony in UK and Ireland. In contrast, numbers at Lady's Island Lake rose from 66 in 2004 to 74 in 2005 (1986-2004 mean = 67 pairs, s.d. ± 41). The species kept a foothold at colony C with two pairs compared to c.12 in 2004. At Larne Loch Island (**north-east Ireland**), numbers of nesting roseate terns fell just below the 11-year mean of eight pairs (s.d. ± 5).

At Coquet Island (**north-east England**), the largest colony in the UK, 91 pairs nested in 2005, the most since 1970. For the first time in three years, one pair of roseate terns nested on the Farne Islands. In **east Scotland**, numbers at the only remaining site remained stable at a low level. Only a single pair of roseate terns nested in **south-east England** and, for a second consecutive year, none bred in **Wales**.

Breeding success (Table 3.19.2)

Breeding success in the UK and Ireland was again high and similar to that in 2004. Productivity was, at 1.41 chicks per pair, well above the 10-year mean of 1.22 (s.e. ± 0.07).

Overall productivity at the three colonies in **south-east Ireland** was high. At Rockabill, the largest colony, 1.48 chicks fledged per pair in 2005 (*cf.* 1.48 in 2004 and 1.58 in 2003). Productivity at Lady's Island Lake was 1.41 chicks per pair, which is well above the colony average (1990-2004 mean = 0.90, s.e. ± 0.11).

At Larne Lough Island (**north-east Ireland**), four chicks were seen to be fledged/near fledging, resulting in a minimum productivity of 0.57 chicks per pair.

At Forth B (**east Scotland**), four pairs raised four young. On Coquet (**north east England**), periods of apparently reduced food availability and bad weather affected roseate terns less than some other tern species. Productivity was 0.98 chicks per pair; only slightly below the colony average (1991-2004 mean = 1.03 chicks per pair, s.e. ± 0.05), and average clutch size was 1.59 eggs per clutch, which is higher than in the previous two years (Lowe *et al.* 2005). The single pair on the Farne Islands fledged one young and the pair in **south-east England** abandoned their nest.

Table 3.19.2 Productivity of roseate terns 2004–2005; number of chicks per breeding pair.

Region/Site	Pairs	2004 fledged/pair	Pairs	2005 fledged/pair
E Scotland				
Forth B	4	1.25	4	1.00
Forth C	-	-	-	-
NE England				
Farnes	0	-	1	1.00
Coquet	73	0.86	91	0.98
New colony B	0	-	0	-
SE England				
Colony A	2	0.00	1	0.00
Wales				
Anglesey A	0	-	0	-
NE Ireland				
Larne Lough	8	<0.75	7	0.57
SE Ireland				
Rockabill	677	1.48	657	1.47
Lady's Island Lake	66	1.24	74	1.48
Colony C	<i>c.</i> 12	<i>c.</i> 1.25	2	2.00
Total	842	1.40	837	1.41

3.20 Common tern *Sterna hirundo*

Overall, breeding numbers of common terns increased slightly between 2004 and 2005. Increases were largest in NE and SE Ireland, while a substantial decrease occurred in NE Scotland. Colonies adjacent to the Irish Sea were the most productive. In contrast, presumed food shortages depressed productivity in west and north Scotland, while predation and presumed localised food shortages reduced productivity at colonies in England.

Breeding numbers (Tables 3.20.1 and 3.20.2)

In **south-west Scotland**, overall numbers remained stable. However, the colony at Glas Eileanan, Sound of Mull decreased by 23%, but remained well above the colony average. Common terns returned to Sgeir nan Caillich, after being absent in 2004 (*cf.* 200 in 2003). At Liath Sgeir Mhor, Sound of Jura, 105 pairs nested; an unusually high figure for this site as very few terns nested there in the past. In **north-west Scotland**, numbers increased by 21% to 256 pairs. The largest increase was at Eilean nan Gabhar, where numbers reached a high of 90 pairs (*cf.* 24 in 2004).

In **Orkney**, a colony on Hoy was re-occupied by 30 pairs. At least 20 pairs nested at six sites in **Shetland**, an increase of *c.* 67% from 2004. In **north Scotland**, numbers declined for the third consecutive year, to less than half that during 2002. A 12% decline from 2004 occurred at the Avoch Fish Farm following three years of increase, and at Barmac's the number halved compared with 2004. Breeding terns were absent from Easter Ross/Nigg for the first time since 1989, probably due to low availability of sandeels (Swann 2005b). At Arduillie 11 pairs were recorded, compared with 18 in 2004. Although an increase occurred at Alness Point compared with 2004, numbers were less than a fifth of the long-term colony mean.

Table 3.20.1 Regional population changes at monitored common tern colonies, 2004–2005 (breeding pairs). Superscript = number of colonies counted in both years. Regional samples <100 pairs not included.

Region	2004	2005	2004-2005 % change
SW Scotland	1,171	1,172	+0.1 ¹⁶
NW Scotland	219	265	+21.0 ¹²
N Scotland	334	232	-30.5 ⁶
NE Scotland	470	152	-67.7 ⁸
SE Scotland	872	999	+14.6 ⁵
NE England	1,709	1,831	+7.1 ¹²
E England	779	961	+23.4 ¹¹
SE England	680	578	-15.0 ⁹
SW England	418	380	-9.1 ⁴
Wales	970	942	-2.9 ⁴
NW England	<i>c.</i> 208	207	<i>c.</i> -0.5 ⁵
NE Ireland	1,565	2,096	+33.9 ⁶
SE Ireland	1,380	1,570	+13.8 ²
Britain and Ireland	10,775	11,385	+5.7¹⁰⁰

The apparent decline of 67% recorded in **north-east Scotland**, was largely attributable to a decrease at Site X where only minimum numbers could be estimated; actual numbers will have been higher. At Loch of Strathbeg, 30 pairs nested on Baycroft Island, but abandoned the site in mid-June. Some of these birds probably re-located to Starnaftin Pools, resulting in an overall decrease of 13% from 2004. Only five pairs nested at St. Fergus, a record low for this site. For the first time since 1995, no common terns nested on the Sands of Forvie (*cf.* 19 in 2004). At Kirkhill, 55 to 60 pairs bred compared with *c.* 17 in 2003, 11 in 2002 and 55 in 2001.

Numbers at monitored sites in **south-east Scotland** increased overall by 15% compared with 2004. There was little change on the Isle of May and numbers remained at less than half the long-term mean. At Long Craig, 120 pairs were recorded: a decline of around 30% from 2004, but still well above the 1986-2004 mean of 87 pairs (s.d. ± 37). The colony at Grangemouth was not counted in 2005 (>106 pairs in 2004). Common terns returned to Rosyth, where 40 pairs were counted compared with 75 pairs in 2003. Numbers at Leith Docks increased by 20% compared with 2004; the second highest total ever recorded at this site.

Table 3.20.2 Population changes of common terns 2004–2005 and 1986-2004 at selected sites referred to in the text. (P = pairs; I = individuals).

Region/Site		2004	2005	2004-2005 % change	1986-2004 Mean (\pm s.d.)	No. years
SW Scotland						
Sgeir na Caillich	P	0	194	-	179 (123)	15
G.Eileanan, Sd Mull	P	950	727	-23.5	548 (239)	19
N Scotland						
Alness Point	P	15	20	+33.3	110 (75)	17
Avoch, Ross	P	160	140	-12.5	96 (43)	5
Barmac's	P	100	52	-48.0	154 (141)	17
Nigg	P	33	0	-100.0	160 (108)	16
NE Scotland						
'Site X'	P	300	>27	-<91.0	109 (112)	7
Loch of Strathbeg	P	98	85	-13.3	91 (35)	18
St. Fergus	P	30	5	-83.3	137 (71)	18
SE Scotland						
Isle of May	P	62	65	+4.8	149 (112)	19
Leith Docks	P	639	764	+19.6	482 (175)	16
NE England						
Coquet	P	1,085	1,155	+6.5	794 (187)	19
Farnes	P	133	160	+20.3	216 (92)	19
Teemouth	P	455	477	+4.8	393 (119)	7
C England						
Rye Meads	P	44	39	-11.4	43 (5)	14
E England						
Scolt Head	P	150	240	+60.0	170 (80)	19
Blakeney	P	120	150	+25.0	199 (66)	19
SE England						
Pitts Deep - Hurst	P	c.225	256	c.+13.8	149 (94)	18
Langstone Harbour	P	192	151	-21.4	78 (54)	19
Chichester Harbour	P	2	0	-100.0	21 (26)	19
SW England						
Brownsea	P	246	240	-2.4	156 (42)	19
Lodmoor	P	c.47	c.50	c.+6.4	31 (15)	7
Wales						
Shotton Pools	P	656	c.587	-10.5	350 (160)	19
Cemlyn	P	72	72	0.0	65 (26)	17
NW England						
Seaforth	P	c.161	175	c.+8.7	76 (68)	19
NE Ireland						
Larne Lough	P	567	480	-15.3	343 (191)	17
Carlingford Lough	P	289	341	+18.0	364 (139)	16
Strangford	P	529	1,104	+108.7	591 (110)	19
SE Ireland						
Rockabill	P	1,068	1,099	+2.9	414 (299)	19
Lady's Island Lake	P	312	c.471	c.+51.0	307 (93)	15

A small overall increase was recorded in **north-east England**. The colony on Coquet reached a record high since 1981. Although numbers on the Farne Islands increased further from their record low in 2003, they remained well below the colony average. A small increase was also noted at the Teesmouth colonies.

At Rye Meads (**central England**), numbers declined for a second year running, to 39 pairs, which is below the long-term average of 43 pairs.

An overall increase of 23% occurred at sampled colonies in **east England**. With the exception of Snettisham, all Norfolk colonies increased from the low in 2004, although Holkham, at 65 pairs, and Blakeney, at 150, remained below their 1986-2004 colony averages of 74 and 199 pairs, respectively. The colony at Minsmere increased to 81 from 31 pairs in 2004, after three years of decline, to its second highest level since 1979. Elsewhere in the region, 197 pairs nested on the rafts on Breydon Water, this being similar to the count in 2004. Between 40 and 45 pairs were recorded at Trimley Marshes, compared with 17 in 2004.

Overall, there were fewer pairs recorded at sample colonies in **south-east England** than in 2004. Only one pair nested at Dungeness, following a steady decline from a peak count of 350 pairs in 1988 (1986-2004 mean = 177, s.d. ± 108). No common terns nested at the North Solent NNR for the third time in four years (60 pairs in 2004, 1986-2004 mean = 156, s.d. ± 106). Numbers also declined at Langstone Harbour but were still around double the colony mean. In contrast, 153 pairs bred at Rye Harbour: the highest count on record (1986-2004 mean = 77, s.d. ± 28).

A small decline from 2004 was noted at colonies in **south-west England**; largest decreases were on the Isles of Scilly (65 pairs in 2005 *cf.* c.90 in 2004) and at Chesil Fleet (25 pairs in 2005 *cf.* 35 in 2004).

There was little change in overall numbers in **Wales** and a small decrease at Shotton was almost compensated by an increase at an Anglesey site (160-200 pairs in 2005 *cf.* 135 in 2004).

Overall numbers in **north-west England** remained stable, although the colony at Hodbarrow declined to 20 pairs, the lowest count in ten years (30 pairs in 2004).

In **north-east Ireland**, overall numbers increased by a third since 2004, thus returning to levels recorded in 2003. Numbers at Strangford Lough more than doubled from 2004 to a record high. A decrease was recorded at Larne Lough, although numbers remained well above the colony average. The colony at Green Island, Carlingford, started to recover from its low in 2004.

Overall, numbers in **south-east Ireland** increased by 14%, largely due to a 50% increase at Lady's Island Lake. The colony on Rockabill remained broadly stable.

Breeding success (Tables 3.20.3 and 3.20.4)

As a result of presumed low food availability and predation, overall productivity in Scotland was well below that of 2004. In England, breeding success was at a similar low level to that in 2004, while colonies adjacent to the Irish Sea were generally very productive.

Depredation by otters and starvation of chicks depressed productivity at the three largest sites in **south-west Scotland** (Glas Eileanan, Sgeir nan Caillich, Liath Sgeir Mhor), resulting in overall productivity being half that of 2004. A shortage of food was most notable at Glas Eileanan where at least 396 large chicks starved in mid-July, and a further 48 chicks starved at Sgeir nan Caillich. At Liath Sgeir Mhor, at least 33 large chicks starved and otters killed a further 80, thus resulting in a productivity of 0.48-0.95 chicks per pair from 105 pairs (Craik 2005). Success in **north-west Scotland** was similar to that in 2004. At Eilean nan Gabhar,

mink depredated eggs despite control measures so no young fledged. However, productivity at other mink controlled sites was between 1.00 and 1.88 chicks per pair (four sites with between five and 45 pairs). Herring gull predation depressed productivity at Eilean Dubh, Loch Ailort, (*c.*0.56 chicks per pair from 63 pairs, *cf.* 1.43 from 21 pairs in 2004).

Six young fledged from 20 pairs in **Shetland**. The thirty pairs nesting on Hoy (**Orkney**) raised 30 chicks to fledging.

Colonies in **north-east Scotland** were more productive than in 2004. At least 45 young fledged at Loch of Strathbeg from 85 nests, although this is probably an underestimate of success (S. Paterson, pers. comm.). At Kirkhill, productivity was thought to have been high, but no quantitative data were available.

Few quantitative data were available from sites in **south-east Scotland**. At Long Craig, productivity was high, at around 1.17 chicks per pair. It was thought that at the region's largest colony - Leith Docks - fledgling numbers were high, although no count was made (P. Gordon pers. comm.). Productivity on the Isle of May was low, at 0.15 chicks per pair.

Table 3.20.3 Common tern productivity, grouped regionally, 2004–2005: expressed as number of chicks fledged per breeding pair at sample colonies (superscript n = number of colonies). When more than one colony was sampled in a given region, the overall figure given is the total number of fledglings divided by the total number of breeding pairs across all colonies. Note that the same colonies have not necessarily been monitored in each region each year and that the number of pairs given here are sample sizes (and do not necessarily indicate population changes between years).

Region	2004 chicks fledged/pair			2005 chicks fledged/pair		
	Pairs ⁿ	Range	Overall	Pairs ⁿ	Range	Overall
SW Scotland	1,177 ¹¹	0.00-1.53	1.36	1,167 ¹²	0.00-0.87	0.67
NW Scotland	212 ⁹	0.00-1.76	0.62	259 ⁹	0.00-1.88	0.57
N Scotland	316 ⁶	0.00-1.13	0.59	272 ⁷	0.00-0.73	0.40
NE Scotland	140 ⁵	0.00-1.00	0.28	142 ⁴	0.00-0.67	0.47
SE Scotland	62 ¹	-	0.10	225 ³	0.03-1.17	0.67
Total Scotland	1,907 ³²	0.00-1.76	1.03	2,065 ³⁶	0.00-1.88	0.63
NE England	1,558 ⁵	0.57-1.50	0.57	1,660 ⁵	0.00-2.35	0.57
C England	44 ¹	-	1.41	39 ¹	-	1.59
E England	701 ⁹	0.00-1.67	0.27	893 ⁹	0.00-1.33	0.32
SE England	613 ⁷	0.00-1.67	0.41	318 ⁵	0.00-1.31	0.73
SW England	418 ⁴	0.49-1.86	0.72	380 ⁴	0.10-1.60	0.33
NW England	208 ⁴	0.00-0.50	0.22	204 ³	0.00-0.54	0.47
Total England	3,542 ³⁰	0.00-1.86	0.49	3,494 ²⁷	0.00-2.35	0.50
Wales	898 ³	0.60-0.99	0.91	688 ²	1.35-1.60	1.38
NE Ireland	168 ²	1.21-1.33	1.21	172 ³	0.83-1.60	1.00
SE Ireland	1,068 ¹	-	1.71	1,161 ²	0.88-1.44	1.41

Productivity in **north-east England** was overall equal to that in 2004. On Coquet, a period of inclement weather and apparent food shortage depressed productivity (Lowe 2005). Success at the Teesmouth colonies was 0.19 chicks per pair, the lowest for at least eight years. Low water levels around one of the islands enabled a fox to access the island and to prey on eggs and chicks, resulting in no young fledged. In addition, the lack of suitable substrate on which to develop scrapes on two rafts resulted in very low hatching success (A. Snape, pers. comm.). At Rye Meads (**central England**), 62 young were ringed, equating to a productivity of less than 1.59 chicks per pair.

Breeding success in **east England** in 2005 was similarly low to that in 2004. This was largely due to the very low productivity of the north Norfolk colonies, where 515 common terns at four colonies raised just 12 young to fledging. Tidal inundation depressed productivity at Blakeney Point, Holkham and Scolt Head. An apparent food shortage early in the season at the latter site was also suspected to have affected breeding success (M. Rooney, pers. comm.). Productivity at Breydon Water was 0.64 chicks per pair, higher than that in 2004 (0.51 chicks per pair). At Trimley Marshes, productivity was high, at 1.33 chicks per pair, but still lower than in 2004 (*c.*1.76). In contrast, at Minsmere common terns fledged 0.36 chicks per pair, which is believed to be less productive than in 2004 (but no quantitative data were available).

Table 3.20.4 Productivity of common terns expressed as chicks per pair 2004–2005 and 1986–2004 at selected sites referred to in the text.

Region/site	2004	2005	1986–2004	
			Mean (\pm s.e.)	No. of years
SW Scotland				
E an Ruisg, L Feochan	0.56	0.87	1.95 (0.30)	4
Sgeir nan Caillich, L Melfort	-	0.77	0.65 (0.31)	6
G. Eileanan, Sd Mull	1.53	0.69	0.50 (0.24)	6
N Scotland				
Avoch Fish Farm	1.13	0.71	0.79 (0.28)	5
NE Scotland				
St Fergus	>0.23	0.00	0.17 (0.05)	11
SE Scotland				
Long Craig	-	<i>c.</i> 1.17	0.88 (0.12)	11
NE England				
Coquet	0.57	0.60	1.06 (0.145)	19
C England				
Rye Meads	1.41	<1.59	1.52 (0.14)	9
E England				
Hoveton Great Broad	0.87	0.50–1.00	1.24 (0.14)	4
Snettisham	0.00	0.02	0.30 (0.11)	13
Holkham	0.00	0.00	0.43 (0.13)	14
Blakeney	0.02	0.01	0.48 (0.14)	13
SE England				
Langstone Harbour	0.19	0.21	0.56 (0.13)	17
Hayling Island	0.09	0.00	0.25 (0.09)	3
SW England				
Brownsea Is	0.49	0.10	0.62 (0.07)	16
Lodmoor	<i>c.</i> 1.36	<i>c.</i> 0.94	1.54 (0.19)	7
Wales				
Shotton	0.99	<i>c.</i> 1.35	1.29 (0.134)	16
Cemlyn	+	0.51–2.14	0.59 (0.24)	9
NW England				
Seaforth	0.19	0.54	0.61 (0.07)	19
Rockcliffe	0.00	0.00	0.12 (0.06)	12
NE Ireland				
Belfast Lough	>1.21	>1.00	1.43 (0.14)	4
SE Ireland				
Rockabill	1.71	1.44	1.61 (0.13)	14

Overall productivity in **south-east England** was higher than in 2004 and just above the regional average (1986–2004 mean = 0.69 chicks per pair, s.e. \pm 0.08). At the South Binness sub-colony at Langstone Harbour, productivity was as low as in 2004, owing to competition from black-headed gulls and an assumed shortage of food (C. Cockburn, pers. comm.).

Productivity at the Rye Harbour colony was 1.31 chicks per pair, which is below the 2004 figure (*cf.* 1.67 in 2004) but still above the colony average (1986-2004 mean = 1.03 chicks per pair, *s.e.* ± 0.17). At Pitt's Deep – Hurst (Keyhaven) at least 23 large chicks were counted from the 256 nests, but the final outcome was unknown (*cf.* none fledged in 2004).

In **south-west England**, overall productivity was less than half that of 2004. This was largely due to heavy avian predation at Brownsea Island, the region's largest colony. Productivity on the Isles of Scilly was low at 0.23 chicks per pair (*cf.* 0.57 in 2004), owing to human disturbance that forced the terns to relocate to unmanaged sites where levels of predation by Eurasian oystercatcher *Haematopus ostralegus* and gulls were high. In contrast, favourable conditions resulted in a high productivity of 1.60 chicks per pair at Chesil Fleet (*cf.* 1.86 in 2004). At least 47 chicks fledged at Lodmoor, resulting in a minimum productivity of 0.94, well below the 7-year mean.

Common terns in **Wales** were very successful in 2005, with a productivity of 1.37 chicks per pair, which is above the long-term average (1990-2004 mean = 1.20, *s.e.* ± 0.11). Around 162 chicks fledged from 101 pairs on the Skerries (=1.60 chicks per pair *cf.* 1.13 in 2003). At Shotton, productivity was higher than in 2004 and above the colony average.

Overall productivity in **north-west England** was higher than in 2004, although the colonies at Hodbarrow and Rockliffe Marsh failed to fledge any young (from 20 and 9 pairs, respectively). In contrast to 2004, food availability was apparently high around the Seaforth colony, but depredation by moorhen and adverse weather early in the season depressed productivity (S. White, pers. comm.).

In **north-east Ireland**, quantitative data were available only from the small colonies. However, it was thought that fledging success was moderately high at Larne Lough (M. Tickner, pers. comm.) and high at Strangford Lough (H. Thurgate, pers. comm.). At Belfast Lough, a minimum of 140 chicks fledged, a productivity of at least 1 chick per pair. At Big Copeland, disturbance, probably from black-headed gulls nesting amongst common terns, depressed productivity (*c.* 0.83 chicks per pair from 25-30 pairs) (K. Leonard, pers. comm.).

Productivity at Rockabill (**south-east Ireland**) was 1.44 chicks per pair which, while below the colony average, is still high; Rockabill continues to be amongst the most productive sites in Britain and Ireland. At a second site in the region, productivity was 0.81 chicks per pair (62 pairs, no comparative data available for other years).

3.21 Arctic tern *Sterna paradisaea*

In 2005, the number of Arctic terns in Shetland and Orkney began to recover from the dramatic declines in 2004. Increases also occurred in most other regions, the greatest being in NE England and Wales. Overall breeding success was higher than in 2004, although only marginally so in the Northern Isles. Food availability was again apparently low in Shetland and Orkney and in parts of west Scotland. Colonies in NE England and Wales were very productive.

Breeding numbers (Tables 3.21.1 and 3.21.2)

Numbers of breeding Arctic terns doubled to 524 pairs at the twenty sites visited as part of the Mink-Seabird Project in **west Scotland**. The largest colony was found on Fladda (Sound of Luìng), where Arctic terns did not nest in the previous two seasons. Following years of mink control, a new colony of 88 pairs established at Eilean Rubha an Ridire (Sound of Mull), where no terns bred between 1980 and 2003 and only a very small number in 2004 (Craik 2005). Elsewhere in the region, 13 sites on Tiree collectively held 450 pairs, a decline of a

quarter from 2004, although the colony at The Reef on Tiree increased by 44% to 127 pairs. At Coll and Gunna, the same numbers as in 2004 were recorded (18 and 80 pairs, respectively). There was little change at Balranald (67 pairs in 2005, 68 in 2004), whilst the number on the Isle of Eigg fell below the colony mean.

Table 3.21.1 Population changes at monitored Arctic tern colonies, 2004–2005 (breeding pairs). Superscript = number of colonies/sites counted in both years. Regional samples <100 pairs not included.

Region	2004	2005	2004-2005 % change
SW & NW Scotland	1,269	1,122	-11.6 ²⁹
Shetland	270	1,142	+323.0 ⁷
Orkney	1,696	4,141	+144.2 ¹¹
N Scotland	220	307	+39.5 ⁷
NE Scotland	450	665	+47.8 ⁷
SE Scotland	669	610	-8.8 ³
NE England	4,271	4,719	+10.5 ³
Wales	1,984	2,663	+34.2 ⁴
NE Ireland	1,478	1,197	-19.0 ⁵
SE Ireland	572	436	-23.8 ²

After the dramatic declines of 2003 and 2004, numbers of nesting pairs in **Shetland** started to increase in 2005. On Fetlar, numbers were the highest since 1998, and the small colony on Hermaness was three times the 1987-2004 mean of 20 pairs (s.d. ± 20). On Foula, 107 pairs of Arctic terns nested; an increase from the complete lack of breeding in 2004 but still low for the site. Similarly, the 40 pairs that nested on Fair Isle in 2005 represent only 5% of the colony average. Elsewhere in Shetland, 393 pairs were recorded on Papa Stour compared with none in 2004.

A recovery in breeding numbers was also reported from **Orkney**; over 4,100 breeding pairs were recorded at sampled sites across the archipelago, compared with *c.* 1,700 in 2004. At the North Hill reserve on Papa Westray, 1,050 individuals were observed, compared with only 22 in 2004 (but this is still only a third of the colony mean). Similar numbers nested on Muckle Skerry, Swona and Westray. Colonies of between 300 and 800 individuals were recorded at Copinsay, North Ronaldsay, Littlequoy and Burray Haas (Burray) and Flotta. Smaller colonies were scattered around the archipelago. At all sites higher numbers were recorded than in 2005

Numbers at sample sites in **north Scotland** increased by 40% from 2004, but despite this just over half the sites occupied in 2003 held any breeding Arctic terns. It is thought that disturbance led to the abandonment of some sites such as Alness Point and Skelbo (D. Butterfield, pers. comm.). For the first time since recording began in 1990, no terns nested in Easter Ross, apparently because of low sandeel availability (Swann 2005b). In contrast, numbers at Dalchalm doubled from 2004 to 87 pairs. The Portgower colony reached 150 pairs: the highest level since recording began at this site in 2000.

All sites but one in **north-east Scotland** reported increases, the greatest being at Kinloss and St Fergus. The latter site reached its highest count since 1998, whilst numbers at Kinloss remained well below the colony average. Although the number at the Sands of Forvie recovered from the nadir of 2004, it was only just over half the long-term mean for this site. Around 9% fewer Arctic terns than in 2004 nested on the Isle of May (**south-east Scotland**), but numbers remained well above the colony average.

In **north-east England**, overall numbers at monitored colonies increased to their highest total since 1986. A 17% decrease at Long Nanny was more than compensated by substantial

increases on Coquet and the Farne Islands. On Coquet, numbers were the highest since recording began in 1969, and those on the Farne Islands reached an 8-year high. Additionally, over 80 common/Arctic terns (*cf.* 30 in 2004 and >60 in 2003) nested at Lindisfarne, most of these being Arctic terns (P. Davey, pers. comm.). Blakeney Point was the only site in **east England** to report nesting Arctic terns: eight pairs compared with six in 2004. One pair nested (unsuccessfully) on the Isles of Scilly (**south-west England**).

Table 3.21.2 Population changes of Arctic terns 2004–2005 and 1986–2004 at selected sites referred to in the text. (P = pairs; I = individuals).

Region/Site		2004	2005	2004-2005 % change	1986-2004	
					Mean (±s.d.)	No. years
SW Scotland						
Fladda, Sd Luing	P	0	c.150	-	75 (110)	10
NW Scotland						
Isle of Eigg	P	120	49	-59.2	57 (49)	18
Shetland						
Fair Isle	P	11	40	+263.6	816 (710)	18
Foula	P	0	107	-	651 (447)	18
Fetlar	P	67	537	+701.5	505 (351)	14
Orkney						
North Hill	I	22	1,050	+4,672.7	3,142 (1,846)	17
N Scotland						
Nigg	P	4	0	-100.0	91 (62)	15
NE Scotland						
Sands of Forvie	P	25	45	+80.0	85 (67)	16
St Fergus	P	305	451	+47.9	331 (134)	17
Kinloss	P	65	104	+60.0	176 (136)	17
SE Scotland						
Isle of May	P	666	609	-8.6	485 (239)	19
NE England						
Coquet	P	828	1,112	+34.3	668 (159)	19
Farnes	P	1,970	2,380	+20.8	2,533 (960)	19
Long Nanny	P	1,473	1,227	-16.7	581 (634)	16
Wales						
Skerries	P	1,505	2,035	+35.2	903 (449)	19
NW England						
Foulney	P	33	40	+21.2	42 (12)	18
NE Ireland						
Strangford Lough	P	414	582	+40.6	178 (103)	19
Big Copeland	P	c.1,000	c.575	-42.5	425 (281)	13
SE Ireland						
Rockabill	P	211	204	-3.3	49 (57)	19
Lady's Island Lake	P	361	c.232	-35.7	176 (100)	13

Arctic terns in **Wales** reached record high levels, increasing by 34% compared with 2004. The small Cemlyn colony increased to its highest total since 1997 and the highest numbers on record were reported from the Skerries and the other Anglesey colony. On Foulney (**north-west England**), the number increased by 21%, compared with 2004, to just under the colony average. On the **Isle of Man**, 13 pairs nested compared with 15 in 2004 and 7 in 2003.

Following the record high level in 2004, numbers at Big Copeland (**north-east Ireland**), declined by over 40%, but remained above the colony average. In contrast, the colony at Strangford Lough continued to increase, reaching the highest total on record. A small decline occurred on Rockabill (**south-east Ireland**), although numbers were the second highest since re-colonisation in the early 1990s. At Lady's Island Lake, numbers decreased by 36% compared with 2004, but remained well above the colony average.

Breeding success (Tables 3.21.3 and 3.21.4)

In 2005, Arctic terns were overall considerably more successful than in 2004, although presumed reduced food availability again depressed productivity mainly in Orkney, Shetland, and sites in western Scotland. Breeding success in north-east England and Wales was high despite poor weather.

Table 3.21.3 Arctic tern productivity, 2004–2005, grouped regionally: expressed as number of chicks fledged per breeding pair at sample colonies (superscript n = number of colonies). When more than one colony was sampled in a given region, the overall figure given is the total number of fledglings divided by the total number of breeding pairs across all colonies. Note that the same colonies have not necessarily been monitored in each region each year and that the number of pairs given here are sample sizes (and do not necessarily indicate population changes between years).

Region	2004 chicks fledged/pair			2005 chicks fledged/pair		
	Pairs ⁿ	Range	Overall	Pairs ⁿ	Range	Overall
SW Scotland	960 ⁹	0.00-1.75	0.40	1,056 ¹⁵	0.00-1.86	0.47
NW Scotland	183 ³	0.00-0.30	0.27	50 ²	-	0.00
Shetland	353 ⁶	0.00-0.06	0.02	1,125 ⁶	0.00-0.70	0.23
Orkney	175 ⁶	0.00	0.00	2,879 ⁹	0.00-0.30	0.02
N Scotland	226 ⁷	0.00-0.42	0.18	307 ⁵	0.00-0.88	0.49
NE Scotland	140 ⁴	0.00	0.00	561 ⁴	0.03-0.23	0.05
SE Scotland	3 ²	0.00	0.00	610 ²	-	0.17
NE England	4,271 ³	0.07-0.41	0.20	4,719 ³	0.75-1.13	0.87
E England	8 ²	0.00	0.10	8 ¹	-	0.00
Wales	1,962 ²	0.49-0.50	0.49	2,035 ¹	-	1.20
NW England	33 ¹	-	0.24	40 ¹	-	0.48
SE Ireland	211 ¹	-	<0.66	221 ²	0.52-1.06	0.56

The apparent food shortage in 2003 and 2004 was largely confined to the Northern Isles and east Scotland, but in 2005 extended to **west Scotland** as well. This was notable in sample colonies on the Uists and Lewis, which were surveyed during a project assessing the effects of mink control in the Western Isles: productivity was low at only 0.05 (Uists) and 0.03 (Lewis) fledged chicks per pair (Ratcliffe *et al.* 2005). Similarly, on Liath-sgeir Mhor (Sound of Jura) many chicks starved and heavy predation by otter further depressed productivity. However, overall productivity in the Mink-Seabird Project area (between Mallaig and Tarbert on the Kintyre peninsula) was similar to that in 2004, at between 0.69 and 0.85 young per pair, probably as a result of mink control (Craik 2005). The new colony at E. Rubha an Ridire (Sd. of Mull) was particularly successful, at *c.* 1.86 chicks per pair. The colony on Fladda was largely deserted in the beginning of July, possibly due to disturbance (Craik 2005). On Tiree (south-west Scotland), nests were abandoned quickly and only two chicks were fledged (J. Bowler, pers. comm.). In contrast, on nearby Gunna 100 chicks fledged from 80 pairs. Complete breeding failure, however, occurred on the Isle of Eigg (north-west Scotland).

Although overall productivity in **Shetland** was low, it was higher than the complete breeding failure in 2004. On Fetlar, 30 young fledged from 537 pairs. Food supply was thought to cause failures, as evidenced by a late start to the breeding season and birds hunting for moths (Devine and Smith 2005). On Noss, heavy predation depleted eggs at two sub-colonies resulting in a productivity of only 0.18 chicks per pair (*cf.* 0.04 in 2004). Productivity was similarly low on Foula, where birds were seen feeding mainly on herring fry (S. Gear, pers. comm.). Fair Isle seemed to have been the area most affected by apparently low availability of sandeels, and no young fledged (Shaw *et al.* 2005). Only one chick fledged from 66 pairs

on Hermaness. Mousa was the most productive site in Shetland; after four years of breeding failure, around 287 pairs fledged ca. 200 young (ca. 0.70 chicks per pair). Birds there fed on juvenile gadoids, which seemed to compensate for the lack of sandeels. Elsewhere in Shetland, over 125 young fledged from c.950 pairs among several colonies (Okill 2005b).

Overall productivity in **Orkney** in 2005 was lower than that in Shetland. Breeding started late and colonies in the north of the archipelago failed almost completely whilst those in the south were more successful (Meek 2005). Around 700 pairs nested at the North Hill colony on Papa Westray. The colony began to decline in mid July and most adults had left by the beginning of August, leaving eggs and chicks behind. Colonies on neighbouring Westray were similarly unsuccessful. Few chicks hatched and none survived to fledging from around 680 pairs. On North Ronaldsay, depredation by great skuas and bad weather resulted in only two chicks fledging from over 300 pairs. More young hatched in the South Isles. On Swona, 218 young were ringed but the final outcome was unknown. A colony on Burray Haas held around 270 pairs and many fledged and large young were seen in mid July (Meek 2005).

Table 3.21.4 Productivity of Arctic terns expressed as chicks per pair during 2004–2005 and 1986–2004 at selected sites referred to in the text.

Region/site	2004	2005	1986–2004	
			Mean (\pm s.e.)	No. years
SW & NW Scotland				
The Reef, Tiree	0.00	0.01	0.04 (0.03)	5
Isle of Eigg	0.01	0.00	0.13 (0.07)	7
Shetland				
Foula	-	0.11	0.15 (0.05)	16
Fair Isle	0.00	0.00	0.24 (0.08)	16
Fetlar	0.00	0.06	0.13 (0.06)	14
Orkney				
North Hill, Papa Westray	0.00	0.001	0.17 (0.10)	11
NE Scotland				
Sands of Forvie	0.00	0.04	0.27 (0.09)	14
St Fergus	>0.14	0.03	0.10 (0.04)	12
SE Scotland				
Isle of May	0.10 ('commic')	0.17	-	-
NE England				
Farnes	0.20	0.75	0.55 (0.12)	9
Coquet	0.41	1.13	0.74 (0.08)	15
Long Nanny	0.07	c.0.87	0.65 (0.13)	15
Wales				
Skerries	0.50	1.2	1.07 (0.11)	15
NW England				
Foulney	0.24	0.48	0.35 (0.05)	19
SE Ireland				
Rockabill	\leq 0.66	0.52	0.90 (0.13)	9

Colonies in **north Scotland** overall were more productive than in 2004. Birds at McDermott's/Barmac's and Kintradwell failed to fledge any young and only seven chicks fledged from 87 pairs at Dalchalm, but those at Portgower were successful. After five years of little or no breeding success, 150 pairs at Portgower raised 100 young to fledging. In addition, at Arduillie productivity was high with 0.88 chicks per pair (50 pairs).

In contrast, very few young fledged in **north-east Scotland**. At St Fergus, otters *Lutra lutra* killed the majority of chicks. Predation was also the main factor in the low productivity at the Sands of Forvie. Although no quantitative data were available, it was thought that from the 104 pairs at Kinloss very few young fledged (M. Cook, pers. comm.). At Garmouth, birds

were slightly more productive and more than 10 chicks fledged from 44 pairs. Productivity on the Isle of May (**south-east Scotland**) was similarly low to that in 2004, at 0.17 chicks per pair, but the reason for this low breeding success is unknown (Bradbury and Alampo 2005).

Breeding success at all colonies in **north-east England** was considerably higher than in 2004. Productivities at Long Nanny, Coquet (sample of 34 nests) and the Farne Islands (sample of 393 nests) were well above the colony averages, although predation (Long Nanny), periods of reduced food availability and inclement weather (Coquet and Farne Islands) affected breeding success. Also, over 80 common/Arctic tern pairs fledged 102 young at Lindisfarne. Due to tidal inundation, the eight pairs in **east England** failed to fledge any young.

Arctic terns in **Wales** remained very productive in 2005, as they have been since 1993 (with the exception of 2004). At the Skerries, productivity was 1.2 chicks per pair (sample of 33 nests) in 2005, whilst that at the other Anglesey colony was *c.* 1.33 chicks per pair (*c.* 579 pairs). Additionally, between 20 and 80 young fledged from 46 pairs at Cemlyn.

Depredation of eggs by gulls reduced productivity at Foulney (**north-west England**). At least two young fledged from 13 pairs on the **Isle of Man**, but the final outcome was unknown.

At Big Copeland (**north-east Ireland**), productivity was *ca.* 0.56 chicks per pair, considerably higher than in the previous two years (0.05 in 2004, 0.06 in 2003). Although no quantitative data were available, it was thought that fledging success was high at Strangford Lough (H. Thurgate, pers. comm.).

Productivity on Rockabill (**south-east Ireland**) was slightly lower than in 2004 and well below the colony average. At a second site in the region, 18 young fledged from 17 pairs.

3.22 Little tern *Sterna albifrons*

Small declines in numbers of breeding pairs at sampled colonies occurred in most regions in 2005, although a substantial increase was noted in SE Ireland. Productivity in England and Wales was low (as in 2004) due to localised presumed food shortages, tidal inundation and predation. Productivity in Scotland was higher than in the previous five years, while the colony in SE Ireland was again the most productive in the UK and Ireland.

Breeding numbers (Tables 3.22.1 and 3.22.2)

Between 2004 and 2005, overall numbers in **south-west Scotland** declined by around 8%. A minimum of 45 pairs nested on Tiree compared with 50 in 2004. On Gunna, numbers declined from 28 to 23 pairs. The only increase was recorded at the Coll reserve, where the colony numbered a record high of 37 pairs. There was little change at two small colonies in **north-west Scotland**, where 15 pairs nested compared with 16 in 2004 and 14 in 2003.

A single pair nested at a south isles site in **Orkney** in 2005. In **north Scotland**, 14 pairs were recorded at two sites compared with 30 at three sites in 2004. Three sites were unoccupied.

Overall numbers in **east Scotland** decreased to their lowest level since 1995, at 31 pairs among five colonies, including a new colony of seven pairs. There were 19 pairs at the Sands of Forvie, the largest colony in the region, a modest increase from the lowest recorded figure for eight years in 2004.

A small overall decline occurred in **north-east England**, largely attributable to a 38% decrease at the Teesmouth colonies to 40 pairs (*c.* 65 pairs in 2004). Declines at Gibraltar Point and Easington were offset by increases on Long Nanny and Lindisfarne. The latter colony reached its highest level since 1995. For the first time in six years, no little terns nested at Donna Nook, although four birds prospected (R Lidstone-Scott, pers. comm.).

Table 3.22.1 Population changes at monitored little tern colonies, 2004–2005 (breeding pairs). Regional samples < 50 pairs are excluded. Superscript = number of occupied colonies counted in both years.

Region	2004	2005	2004-2005 % change
SW Scotland	118	109	-7.6 ¹⁶
NE England	<i>c.</i> 204	194	-4.9 ⁹
E England	676	640	-5.3 ²¹
SE England	169	<i>c.</i> 183	+8.3 ⁹
Wales	89	<i>c.</i> 72	-19.1 ¹
SE Ireland	86	140	+62.8 ²

Table 3.22.2 Population changes of little terns 2004–2005 and 1986-2004 at selected sites referred to in the text.

Region/Site	2004	2005	2004-2005 % change	1986-2004	
				Mean (\pm s.d.)	No. years
SW Scotland					
Coll	27	37	+37.0	20 (6)	6
N Scotland					
Dalchalm	13	5	-61.5	12 (12)	16
E Scotland					
Sands of Forvie	16	19	+18.6	31 (21)	19
NE England					
Lindisfarne	<i>c.</i> 13	35	+169.2	18 (15)	19
Gibraltar Point	52	44	-15.4	28 (17)	19
Tetney	2	3	+50.0	28 (32)	19
Crimdon Dene	<i>c.</i> 65	31	-52.3	20 (25)	19
Long Nanny	32	39	+21.9	36 (13)	19
Easington Lagoon	36	27	-25.0	38 (18)	19
E England					
Blakeney	75	50	-33.3	128 (41)	19
Holkham	64	60	-6.3	98 (27)	19
Great Yarmouth	17	214	+1,158.8	170 (82)	19
Winterton Dunes	150	9	-94.0	113 (91)	5
Benacre	<i>c.</i> 55	5	-90.9	17 (24)	17
SE England					
Rye Harbour	18	18	0.00	34 (16)	19
Hayling Oysterbeds	<i>c.</i> 42	45	+7.1	56 (56)	8
SW England					
Chesil Bank	56	30	-46.4	62 (22)	19
Wales					
Gronant	89	<i>c.</i> 72	-19.1	64 (21)	19
NW England					
Hodbarrow	28	46	+64.3	19 (8)	19
Foulney Is	2	7	+250.0	10 (11)	19
SE Ireland					
Kilcoole	86	100	+16.3	38 (19)	18

Between 2000 and 2005 the number of nesting little terns in **east England** fell by around a quarter from over 880 pairs. Although around 600 birds were present at the Great Yarmouth/Winterton colonies in 2005, they were reluctant to settle. Peak counts were 83

nests at Winterton and 121 nests/active pairs at Great Yarmouth. After predation by corvids and common kestrels *Falco tinnunculus*, only nine nests remained at Winterton in early July (J. White, pers. comm.) whilst a corresponding increase occurred at Great Yarmouth (Smart *et al.* 2005), suggesting that many of the Winterton birds moved there to re-nest. Slightly fewer pairs than in 2004 were recorded at Holkham, and numbers at Blakeney Point were the lowest in 24 years. In contrast, numbers at Scolt Head were the highest recorded since 1984. Most Suffolk sites recorded declines, most markedly at Benacre, where only five pairs nested compared with 50-60 in 2004. From 40 birds that were present early in the season at Bawdsey, only four pairs (*cf.* 47 in 2004) remained after disturbance during a public holiday weekend (M. Wright, pers. comm.).

In **south-east England**, numbers began to recover slightly from the decline between 2003 and 2004. This was largely due to a near doubling of nests at Keyhaven (60 pairs in 2005, *cf.* *c.*34 in 2004). There were also smaller increases, of 7 and 12%, at Hayling Oysterbeds and Langstone Harbour, respectively, whilst numbers at Rye Harbour remained stable, although at only just over half the long-term mean. The colony at Chesil Bank (**south-west England**) declined to its lowest level since 1987.

For a second consecutive year, numbers at Gronant (**Wales**) declined by almost 20%, but remained above the 1986-2004 mean of 64 pairs (s.d. \pm 21).

Between 2004 and 2005, numbers in **north-west England** increased by 77%. The main colony, at Hodbarrow, increased to its highest level since 1977 and seven pairs nested at Foulney, compared with two in 2004.

On the **Isle of Man**, only nine pairs of little terns nested (*cf.* 15 in 2004 and 21 in 2003).

The colony at Kilcoole (**south-east Ireland**) is now the largest outside the species' stronghold in East Anglia; it increased by 16% from 2004 to its highest recorded level. An additional *c.*40 pairs were discovered at Cahore, a former traditional nesting site for little terns, probably not used for 15 to 20 years (Stringer *et al.* 2005).

Breeding success (Table 3.22.3, Table 3.22.4)

Overall, little terns were about as unproductive as they were in 2004, although productivity was almost twice the long-term average in Scotland and again very high in south-east Ireland.

Breeding success in **south-west Scotland** was higher overall than in 2004. On Tiree, 23 young fledged (from at least 45 nests), twice as many as in 2004. By mid-June, birds were observed bringing in only tiny fish to the Tiree reserve colony, indicating a period of low food availability (J. Bowler, pers. comm.). However, food availability seemed to be localised, as birds on Coll had a highly productive season (1.16 chicks per pair), only slightly affected by depredation of eggs by Eurasian oystercatchers and mew gulls (S. Wellock, pers. comm.). On the Western Isles (**north-west Scotland**), productivity on the Uists was low at 0.17 chicks per pair (from 12 pairs) compared with 1.21 chicks per pair (from 19 pairs) on Lewis (Ratcliffe *et al.* 2005).

A single pair fledged two chicks at a south isles site in **Orkney** (Meek 2005). At Dalchalm (**north Scotland**), productivity averaged one chick per pair; the highest in six years, but nine pairs failed to raise any young at a second site.

Overall productivity in **east Scotland** was the highest in five years. This was largely due to the seven pairs at the new colony raising eight young. At the Sands of Forvie, however, productivity was low for the fifth year in succession, largely due to predation by carrion

crows (A. Drysdale, pers. comm.). The apparent food shortage affecting Sandwich tern chicks at this site appeared not to have affected little terns.

Overall productivity at sampled sites in **north-east England** was the highest since 1998. A localised food availability problem early in the season appeared to have affected the colonies at Crimdon Dene and Gibraltar Point (G. Barber, pers. comm., G. Garner, pers. comm.). At the latter colony, depredation by fox and corvids further depressed productivity to its lowest level since 1995. In contrast, birds at Easington, Long Nanny and Lindisfarne were very successful. Predation levels were low at the latter site, as 95% of the colony had relocated to a more protected adjacent mainland site, possibly in response to model decoys and tape play-back in the previous season (P. Davey, pers. comm.).

Table 3.22.3 Little tern productivity, 2004–2005, grouped regionally: estimated number of chicks fledged per breeding pair at sample colonies. Superscript n = number of colonies. When more than one colony was sampled in a given region, the overall figure given is the total number of fledglings divided by the total number of breeding pairs across all colonies. Note that the same colonies may not necessarily have been counted in each region each year and that numbers of pairs given here are sample sizes (and do not necessarily indicate population changes between years).

Region	2004 chicks fledged/pair			2005 chicks fledged/pair		
	Pairs ⁿ	Range	Overall	Pairs ⁿ	Range	Overall
SW Scotland	105 ¹¹	0.00-1.26	0.52	105 ¹⁴	0.00-1.16	0.72
Orkney	-		-	1		2.00
N Scotland	30 ³	0.00-0.69	0.30	14 ²	0.00-1.00	0.36
NE Scotland	22 ²	0.00-0.67	0.18	23 ³	0.00-0.16	0.13
SE Scotland	22 ¹		0.27	8 ²	1.00-1.14	1.13
Scotland total	175 ¹⁷	0.00-1.26	0.41	151 ²²	0.00-1.16	0.62
NE England	204 ⁷	0.00- <i>c.</i> 0.92	<i>c.</i> 0.25	194 ⁸	0.00-1.14	0.60
E England	<i>c.</i> 686 ¹⁶	0.00-1.00	<i>c.</i> 0.15	<i>c.</i> 650 ²⁰	0.00-1.20	<i>c.</i> 0.16
SE England	169 ⁹	0.00-0.28	0.03	183 ⁹	0.00-1.11	0.30
SW England	56 ¹		0.04	30 ¹		0.00
Wales	89 ¹		1.90	<i>c.</i> 72 ¹		0.47
NW England/Isle of Man	45 ³	0.27-1.00	0.76	62 ³	0.00-0.71	0.18
England and Wales total	1,249 ³⁷	0.00-1.00	0.29	1,191 ⁴²	0.00-1.20	0.27
SE Ireland	86 ¹		2.20	100 ¹		1.60

In **east England**, overall productivity was at a similarly low level to that in 2004. Tidal inundation affected all north Norfolk sites and explained why productivity at Blakeney was less than half the colony average (18-year mean: 0.48 chicks per pair, s.e. ± 0.11). In addition, localised presumed food shortages affected the largest sites of Scolt Head, Winterton and Great Yarmouth, with further losses occurring at the latter two sites and Eccles due to common kestrel predation. As a result of depredation by fox, no young fledged at Minsmere. Only two of the region's sites were successful: between 40 and 87 pairs produced 35 to 45 young at Hamford Water, and Trimley Marshes recorded the region's highest productivity of 1.20 chicks per pair (10 pairs).

Overall productivity in **south-east England** was higher than in 2004, but remained slightly below the 1986-2004 mean of 0.35 chicks per pair (s.e. ± 0.06). Productivity at Langstone Harbour was the highest for four years, despite losses to tidal inundation, depredation by foxes and crows and aggression from black-headed gulls. Rats depredated eggs at nearby Hayling Oysterbeds, resulting in complete breeding failure. At Keyhaven, 60 pairs fledged at least 10 young, although it was thought that a pair of great black-backed gulls preyed heavily on chicks (P. Durnell, pers. comm.). The most successful site in the region proved to be Rye Harbour, with a productivity of 1.11 chicks per pair, where depredation by common kestrel and gulls and an early spell of inclement weather was compensated by favourable weather conditions and apparently abundant food supply later in the season.

In contrast to many other colonies, neither food shortages nor bad weather appeared to pose problems at Chesil Bank (**south-west England**), but depredation of eggs by foxes resulted in an unproductive season for a fifth year.

At Gronant (**Wales**), sandblow and predation by small mammals and crows depressed productivity to below half of the long-term average, following three years of high breeding success (R. Hurst, pers. comm.).

Table 3.22.4 Productivity (chicks fledged per pair) of little terns 2004–2005 and 1986–2004 at selected sites referred to in the text.

Region/site	2004	2005	1986–2004	
			Mean (\pm s.e.)	No. years
N Scotland				
Dalchalm	0.69	1.00	0.60 (0.12)	11
NE Scotland				
Sands of Forvie	0.00	0.16	0.30 (0.08)	17
Lossiemouth	0.67	0.00	0.66 (0.31)	6
NE England				
Long Nanny	0.44	1.05	0.55 (0.12)	19
Gibraltar Point	0.46	0.07	0.30 (0.06)	19
Crimdon Dene	c.0.02	0.06	0.62 (0.20)	10
Easington Lagoons	0.00	1.00	0.39 (0.10)	19
Lindisfarne	\geq 0.92	1.14	0.61 (0.17)	17
E England				
Great Yarmouth	0.00	0.05	0.68 (0.14)	18
Winterton Dunes	0.00	0.00	0.54 (0.38)	5
Benacre	c.0.09	0.00	0.39 (0.19)	9
Hamford Water	0.85	0.40–1.12	0.99 (0.18)	10
SE England				
Chichester Harbour	-	0.00	0.21 (0.10)	14
Hayling Island, Langstone	c.0.03	0.00	0.97 (0.35)	7
Langstone Harbour	0.00	0.34	0.36 (0.10)	18
Rye Harbour	0.28	1.11	0.37 (0.09)	18
SW England				
Chesil Bank	0.04	0.00	0.28 (0.05)	19
Wales				
Gronant	1.90	0.47	0.98 (0.15)	19
NW England				
Hodbarrow	1.00	0.13	0.33 (0.08)	19
SE Ireland				
Kilcoole	2.20	1.60	1.01 (0.20)	18

Only six young fledged from 46 pairs at Hodbarrow (**north-west England**). Reasons for the low productivity could not be established, as there were no adverse weather conditions and no apparent food shortages (D. Blackledge, pers. comm.). Five young fledged from seven pairs at Foulney Island, despite depredation of eggs by gulls (K. Milligan, pers. comm.). At Ayres (**Isle of Man**) it was the least successful season on record, with no young fledging due to predation and desertion (L. Samson, pers. comm.).

For the third consecutive year, the colony at Kilcoole (**south-east Ireland**) was very successful, although the productivity of 1.6 chicks per pair was lower than in the two previous years. A 40% decrease in clutches containing three eggs was noted, possibly as a result of bad weather during the main egg laying period. In addition, the level of nest desertion was 10%; much higher than the 1% desertion rate recorded in the previous two years. Avian and human disturbance as well as a high percentage of inexperienced breeders is thought to have contributed to the desertion rate (Stringer *et al.* 2005).

3.23 Common guillemot *Uria aalge*

Between 2004 and 2005, numbers recorded in sample plots increased or remained stable in the Northern Isles, eastern Scotland and in Wales, but decreased in north-west Scotland. While long-term trends in most regions were generally upward, since the late 90s/early 00s numbers in plots have declined in Shetland, Orkney and SE Scotland. Declines have also been observed in whole-colony counts at some colonies. In contrast, the sole monitored colony in NE England, on the Farne Islands, continued to increase over this latter period. Mean productivity in 2005 was, after 2004, the second lowest since 1986. Colonies in the far north of Britain were generally less successful than those farther south. The breeding season was generally late in Scotland, by up to three weeks at Shetland colonies.

Breeding numbers (Tables 3.23.1 and 3.23.2, Figure 3.23.1)

In **Shetland**, overall numbers in sample plots increased for the first time in five years. Significant increases were recorded at Sumburgh Head (+27%, $t=7.218$, d.f.=8, $P<0.001$), Troswick Ness (+25%, $t=8.075$, d.f.=8, $P<0.05$), Burrae (+30%, $t=8.075$, d.f.=8, $P<0.001$), Fair Isle (+35%, $t=7.942$, d.f.=14, $P<0.001$) and Noss (+33%, $t=4.512$, d.f.=8, $P<0.01$). Non-significant increases were detected at Eshaness and Hermaness. At some colonies increases were probably due to higher attendance by off-duty, failed and non-breeding birds rather than an increase in the breeding population (Heubeck 2005). The general decline noted in numbers in plots over the preceding five years is corroborated by whole-colony counts at Noss and Fair Isle. On Noss, a count of 24,138 individuals represented a slight recovery since 2004, but numbers are still low compared with 45,777 individuals recorded in 2001 (Sykes and Bliss 2005). Similarly, on Fair Isle numbers have fallen by 30% since 1999 to 27,320 individuals (Shaw *et al.* 2005).

Numbers in monitoring plots also increased on Papa Westray (**Orkney**), where 24% more birds were recorded than in 2004 although this increase was not statistically significant. However, as in Shetland, numbers in sample plots have been generally declining over the last half decade. Again, this recent decline is also apparent from whole-colony counts. The only whole colony count in Orkney in 2005 was on Copinsay, where 4,674 birds were recorded on 18 May 2005, which is much earlier than the recommended period for counting auks (1-21 June); nevertheless, it may tentatively suggest that numbers are lower than in 1999 when 18,675 birds were counted in June.

In **north Scotland**, where sample plots are monitored at six-year intervals, numbers appeared to be stable between 1999 and 2005. A significant increase was detected at Iresgeo (+12% to 5,071 individuals, $t=8.009$, d.f.=3, $P<0.01$) with significant decreases at An Dun (-22% to 1,114 individuals, $t=5.116$, d.f.=3, $P<0.05$) and at Skirza Head (-16% to 805 individuals, $t=3.822$, d.f.=3, $P<0.05$). Decreases also occurred at Inverhill (-11% to 1,288 individuals) and Badbea (-8% to 1,195 individuals) but neither of these were statistically significant (Swann 2005c). The regional long-term trend is upward, with a significant annual rate of increase. Numbers were also stable in **north-east Scotland**, with virtually no change detected in plots at Fowlsheugh between 2004 and 2005.

In **south-east Scotland**, between 2004 and 2005, an increase of 18% ($t=5.603$, d.f.=12, $P<0.001$) was detected in sample plots at St. Abb's Head (Rideout 2005), although again the general trend has been downward over the preceding five years. Whole-colony counts indicated little change in numbers overall; moderate declines recorded at Craigleith and the Bass Rock were offset by stability in the far larger colony on the Isle of May. On the Farne Islands (**north-east England**), a minimal increase was noted between 2004 and 2005. However, this was the sixth successive year of such increases at this colony and thus continues the upward trend evident since 1992.

Table 3.23.1 Regional population changes at monitored common guillemot colonies (adults attending colony in first three weeks of June). Trends for 1986-2004 are average annual rates of change shown by sample populations; in Orkney and NE Scotland these are based on colonies monitored triennially. Significance of trends is indicated as: n.s. not significant, * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$. Further details of the calculation of trends are given in section 1.2.2.

3.23.1a Counts of adult guillemots in study plots, 2004-2005 (or earlier where monitoring is not carried out annually). Figures are summed means of 5-10 replicate counts of each of the study plots, except in N Scotland where only 2-3 were made.

Region	1999	2003	2004	2005	% change since previous count	% annual change
SW Scotland ^a			156	121	-22.4	-
NW Scotland ^b			3,266	2,127	-34.9	+0.9** 1986-2004
NW Scotland ^c		3,105	-	2,490	-19.8	+0.1 n.s. 1986-2005
Shetland ^d			6,236	8,087	+29.7	-1.9* 1986-2004
Orkney ^e			213	265	+24.4	+1.7 n.s. 1986-2004
N Scotland ^f	9,600	-	-	9,463	-1.4	+2.1*** 1986-2005
NE Scotland ^g			3,702	3,660	-1.1	+3.3* 1986-2004
SE Scotland ^h			1,444	1,702	+17.9	+2.8*** 1986-2004
Wales ⁱ			13,090	15,876	+21.3	+5.9*** 1986-2004

Colonies: ^a Colonsay; ^b Handa; ^c St. Kilda (triennial); ^d Hermaness, Burravoe, Eshaness, Noss, Troswick Ness, Sumburgh Head, Fair Isle; ^e Papa Westray; ^f Caithness; ^g Fowlsheugh; ^h St. Abb's Head; ⁱ South Stack, Lochtyn, New Quay Head, Skomer, Skokholm, Stackpole Head NNR, Elegug Stacks.

3.23.1b Whole-colony counts of common guillemots. Note that whole-colony counts should be treated with some caution as the numbers of birds attending colonies may vary markedly from day to day. Replicate study plot counts are better indicators of population change. Trends given for south-east Scotland are derived from whole-colony counts on the Isle of May only, those for north-east England are from whole-colony counts on the Farne Islands only; those for Wales are from whole-colony counts at Skomer, Skokholm, Stackpole and Elegug Stacks.

Region	2004	2005	2004-2005 % change	% annual change
SW Scotland ^a	5,967	5,038	-15.6	+4.2*** 1986-2004
Shetland ^b	22,251	24,138	+8.5	-
SE Scotland ^c	29,355	28,277	-3.7	+2.6*** 1986-2004
NE England ^d	43,694	46,915	+7.4	+5.4*** 1986-2004
SW England ^e	1,738	1,936	+11.4	-
Wales ^f	29,184	37,977	+30.1	+5.6*** 1986-2003
NW England ^g	8,146	8,765	+7.6	+3.0*** 1986-2004
NE Ireland ^h	1,595	1,383	-13.3	-

Colonies: ^a Mull of Galloway, Ceann a Mhara; ^b Noss; ^c Isle of May, Inchkeith, Craigleith, Fidra, The Lamb, Inchcolm, Bass Rock; ^d Farne Islands; ^e St. Aldhelm's - Durlston, Berry Head (peak June count); ^f Caldey, Barafundle-Giltar, Stackpole Head NNR, Elegug Stacks and nearby coast, Skomer, St Margaret's Island, Bardsey, Ynys Gwylan; ^g St. Bees Head; ^h Isle of Muck.

In **north-west Scotland**, where the trend has been relatively stable over the long-term, a significant decrease in numbers was recorded in sample plots on Handa (-54%, $t=12.202$, d.f.=11, $P<0.001$), resulting in the population index falling to its lowest value since 1986. Sample plots on Hirta, St. Kilda, also held significantly fewer guillemots than in 2003, when last monitored (-20%, $t=8.063$, d.f.=7, $P<0.001$). A whole-colony count of North Rona indicated numbers declined by 41% since 1998 to 6,113 birds. On Haskeir, an increase of 10% was recorded; 760 birds were present in 2005 compared with 691 in 2002.

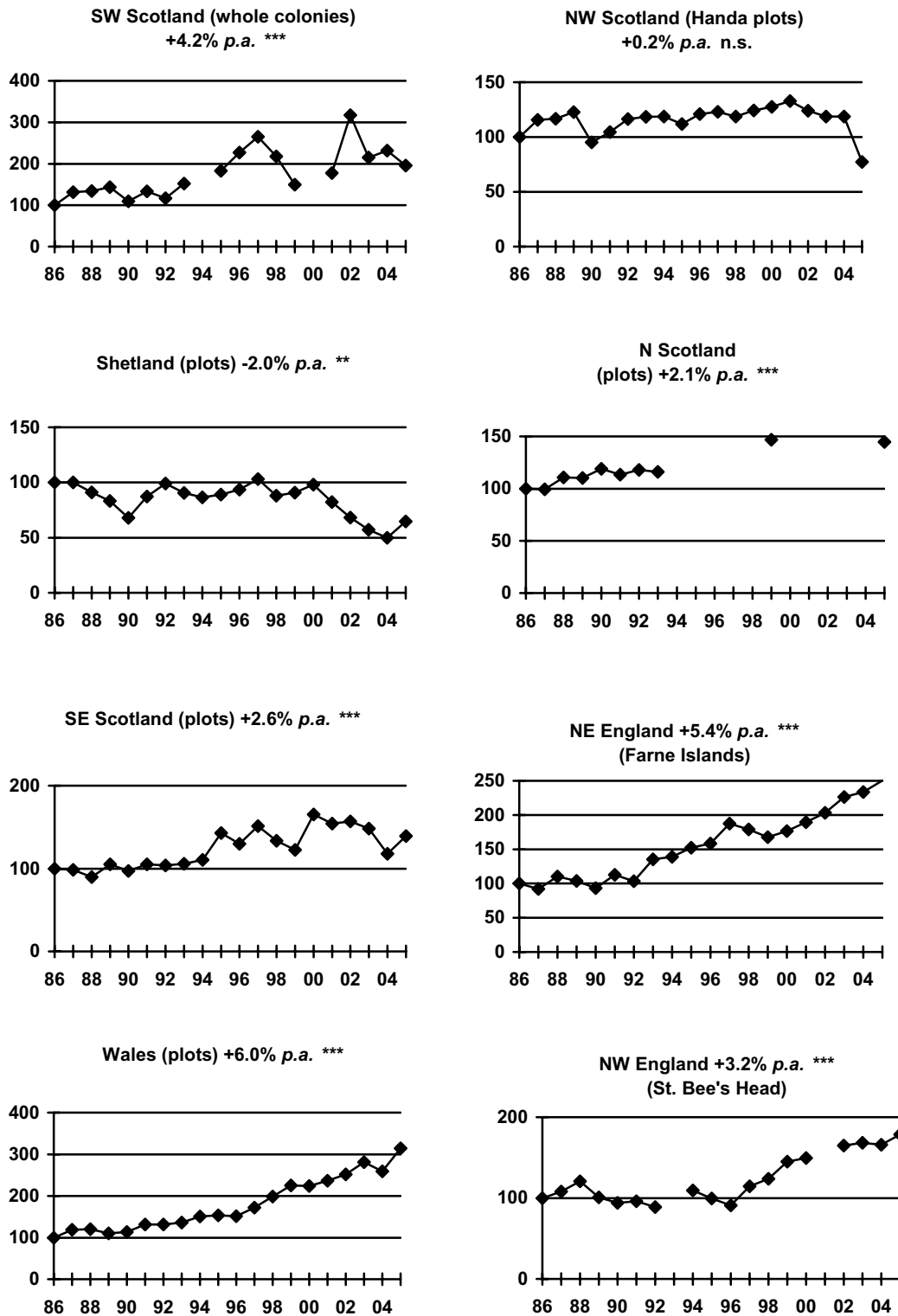


Figure 3.23.1 Regional population indices for breeding common guillemots, 1986-2005 (counts of adults in June). Average annual rates of change were calculated by regression of natural log of index against year (see section 1.2.2. for details). Statistical significance of trends (t-test) indicated as: n.s. not significant, ** $P < 0.01$, *** $P < 0.001$.

Table 3.23.2 Population changes of common guillemots 2004-2005 and 1986-2005 at selected sites referred to in the text. P\W indicates plot or whole-colony counts.

Region/Site		2004	2005	2004-2005 % change	1986-2004 Mean (\pm s.d.)	No. years
SW Scotland						
Mull of Galloway	W	2,275	2,865	+25.9	1,703 (600)	18
Ceann a Mhara	W	3,692	2,173	-41.1	1,391 (1,105)	7
Lunga	W	10,357	6,943	-33.0	7,598 (1,373)	12
NW Scotland						
Handa	P	3,266	2,127	-34.9	3,397 (147)	7
Shetland						
Noss	W	22,251	24,138	+8.5	38,074 (9,601)	5
	P	1,596	2,121	+33.0	2,538 (405)	19
Hermaness	P	1,674	2,078	+24.1	2,730 (739)	10
Eshaness	P	146	189	+29.4	360 (76)	19
Troswick Ness	P	230	287	+24.8	330 (46)	16
Sumburgh Head	P	925	1,174	+26.9	1,517 (343)	19
Burravoe	P	144	187	+29.9	190 (38)	17
Fair Isle	P	1,522	2,049	+34.6	2,583 (525)	15
Orkney						
Papa Westray	P	213	265	+24.4	455 (331)	3
NE Scotland						
Fowlsheugh	P	3,702	3,660	-1.1	3,605 (220)	6
SE Scotland						
Craigleith	W	1,780	1,452	-18.4	1,802 (623)	15
The Lamb	W	1,744	1,578	-9.5	2,828 (831)	18
Fidra	W	566	701	+23.8	342 (219)	15
Isle of May	W	22,970	22,667	-1.3	21,864 (4,318)	19
Bass Rock	W	2,260	1,860	-17.7	3,087 (623)	9
St. Abb's Head	P	1,444	1,702	+17.9	1,552 (294)	16
NE England						
Farne Islands	W	43,694	46,915	+7.4	28,149 (8,540)	19
SW England						
St. Aldhelm's-Durlston	W	752	883	+17.4	557 (113)	16
Berry Head	W	986	1,053	+6.8	848 (139)	11
Wales						
Elegug Stacks	P	3,227	4,091	+26.8	2,058 (729)	17
	W	10,049	12,381	+23.2	7,057 (2,045)	12
Stackpole Head	P	368	482	+31.0	398 (65)	9
	W	1,151	1,457	+26.6	985 (121)	15
Skokholm	P	320	399	+24.7	291 (41)	2
Skomer	P	4,254	4,898	+15.1	2,692 (1,081)	19
	W	14,187	19,711	+38.9	9,801 (3,257)	19
South Stack	P	3,847	4,824	+25.4	3,160 (501)	19
Bardsey	W	688	785	+14.1	422 (214)	16
Ynys Gwylan	W	422	318	-24.6	229 (118)	5
New Quay	P	581	632	+8.8	551 (14)	2
Lochtyn	P	511	551	+7.8	511 (-)	1
St Margaret's Island	W	543	858	+58.0	467 (85)	12
NW England						
St. Bee's Head	W	8,146	8,765	+7.6	5,891 (1,371)	17
NE Ireland						
Isle of Muck	W	1,595	1,383	-13.3	1,153 (349)	6

In **south-west Scotland**, whole-colony counts were 16% lower than in 2004; a large decrease was noted at Ceann a Mhara, Tiree, and numbers on Lunga, Treshnish Isles, where monitoring is undertaken at the end of June, had also declined although variation in the timing of the breeding season between 2004 and 2005 may have had some effect on the observed difference. In contrast, numbers

at Mull of Galloway increased by 26%. Numbers in sample plots were also found to have declined, by 22% since 2004, although only a small sample, on Colonsay, is monitored using this method. The regional trend has generally increased since 1990. Across the Irish Sea, a decline was also recorded in **north-east Ireland**, where numbers on the Isle of Muck fell by 13% since 2004.

In many other west coast regions numbers generally increased between 2004 and 2005. In **north-west England**, where a distinct upward trend is noticeable since 1996, a minimal increase was noted at St. Bee's Head. In **Wales**, where the population index has been steadily increasing since 1986, numbers in sample plots and whole-colony counts increased by 21% and 30%, respectively. Statistically significant increases were recorded in plots at Elegug Stacks (27%, $t=27.670$, d.f.=8, $P<0.001$), Skomer (15%, $t=6.729$, d.f.=14, $P<0.001$), Skokholm (25%, $t=6.782$, d.f.=14, $P<0.001$), Stackpole head (31%, $t=4.035$, d.f.=8, $P<0.01$) and South Stack (25%, $t=2.929$, d.f.=6, $P<0.05$). Numbers in plots at Lochtyn and New Quay were also higher than in 2004 but the increases were proportionally small and non-significant. For whole-colony counts, increases were noted at most colonies, ranging from 14% on Bardsey to 58% on St. Margaret's Island. At Elegug Stacks and Stackpole Head, where whole-colony counts and sample plots run simultaneously, the increases recorded using the different methods were proportionally similar. However, on Skomer, the proportional increase observed in the whole-colony count was more than twice as large as that recorded for the sample plots. Ynys Gwylan was the only Welsh site where the whole-colony count decreased, having fallen by 25%. An increase was recorded at in **south-west England**, particularly at Durlston Head where numbers were 17% higher than in 2004 (Morrison 2005).

Breeding success (Table 3.23.3)

The intensity of monitoring at the colonies listed in Table 3.23.3 varies and this may affect estimates of breeding performance (Walsh *et al.* 1995). Direct comparisons between colonies are therefore inadvisable without prior consultation with the authors.

Table 3.23.3 Breeding success of common guillemot, 2004-2005 and colony averages 1986-2004: estimated number of chicks fledged per site regularly occupied by a pair or per pair laying. Superscript figures for individual colonies are numbers of study plots, figures are mean and standard error across all plots. Statistical significance of between year changes (t-test) indicated as: n.s. – not significant.

Colony	Colony average 1986-2004			2004 chicks fledged/pair			2005 chicks fledged/pair			2004-2005 change	
	Years	Mean	+s.e.	Sites ⁿ	Mean	+s.e.	Sites ⁿ	Mean	+s.e.	Mean	+s.e.
Handa	17	0.70	±0.01	196 ³	0.72	±0.06	143 ³	0.25	±0.08	-0.47	-
Sumburgh Head	16	0.61	±0.05	108 ¹	0.08	-	117 ¹	0.56	-	+0.48	-
Fair Isle	18	0.69	±0.04	169 ²	0.00	-	152 ²	0.23	±0.05	+0.23	-
Papa Westray	15	0.64	±0.05	177 ¹	0.21	-	133 ¹	0.24	-	+0.03	-
Marwick Head	18	0.69	±0.03	84 ¹	0.29	-	67 ¹	0.33	-	+0.04	-
Mull Head	15	0.69	±0.03	86 ¹	0.31	-	74 ¹	0.35	-	+0.04	-
North Sutor	11	0.65	±0.05	89 ²	0.35	±0.06	71 ²	0.43	±0.15	+0.08	-
Isle of May	19	0.75	±0.02	984 ⁵	0.50	±0.01	94 ⁵	0.63	±0.02	+0.13	-
Durlston	8	0.82	±0.02	23 ¹	0.74	-	61 ¹	0.85	-	+0.11	-
Berry Head	7	0.73	±0.04	32 ¹	0.66	-	-	-	-	-	-
Skomer	16	0.72	±0.01	278 ⁵	0.66	±0.02	297 ⁵	0.70	±0.03	+0.07	-
Total no colonies	-	-	-	2,226 ¹¹	0.41	±0.08	1,209 ¹⁰	0.46	±0.07	+0.07¹⁰	±0.07 ns

Mean productivity of common guillemots in 2005 was 0.46 chicks fledged per pair from 10 UK colonies. This was only a slight increase on that recorded from 11 colonies in 2004, which was by far the lowest in the history of the SMP, at 0.41 chicks per pair (s.e. ± 0.08). The overall long-term mean (1986-2004) is 0.70 (s.e. ± 0.02), recorded from between three and 15 colonies annually. Breeding success tended to be lower in the north of Scotland than farther south in Britain.

In **Shetland**, breeding success at Sumburgh Head was higher than in 2004, although 0.56 chicks fledged per egg is still one of the lowest values recorded at the site since 1986. The median laying date was estimated to be 26 May (range 11 May to 19 June), three days later than in 2004, but 24 days later than in 2001. Most losses (45-60%) occurred at the egg stage with many nests failing during strong easterly winds in May (Heubeck 2005). On Fair Isle, the first-egg was laid on 16 May, with few birds attempting to breed until 29 May (Shaw *et al.* 2005). Breeding success, at 0.23 chicks fledged per pair was, after 2004, the second lowest on record for the site and consequently well below average. At Compass Head and Fair Isle, comparison of chick weight against plumage development found that older chicks in particular were up to 50g lighter than normal, which may have implications for their subsequent survival (Heubeck 2005; Okill 2005b; Shaw *et al.* 2005).

It was another year of low breeding success on **Orkney**. The number of chicks fledged per pair at Papa Westray, Mull Head and Marwick Head were similar to those in 2004, which was the poorest year on record (J. Hulsman, pers. comm.; Paice 2005). However, unlike in Shetland, the time of breeding of guillemots in Orkney was judged to be close to average (Meek 2005).

On Handa (**north-west Scotland**), breeding success in 2005 was the lowest on record. This was in sharp contrast to 2004, when success at the site was high in common with other west coast colonies monitored that year. In **north Scotland** breeding success at North Sutor was higher than in 2004 but well below the long-term mean for the site. Predation of eggs and small chicks by gulls was noted and there was evidence that larger sub-colonies were more successful than smaller marginal ones (Swann 2004b).

On Isle of May (**south-east Scotland**), it was also noted as being a late breeding season; the first guillemot egg was laid on 4 May (the latest date yet recorded at the site) and the median laying date was 17 May. Success was higher than for colonies to the north but amongst the lowest values recorded at the site (second lowest, with 2001). Both egg and chick losses, at 21% and 22%, respectively, were lower than in 2004 (33% and 34%) but were well above average for the island (16% and 8%) (Harris *et al.* 2005). Many chicks were again left unattended for long periods while adults spent extended periods foraging at sea, probably because of low food availability, with resultant mortality due to attacks by adjacent territorial adults or starvation. As in 2004, very few sandeels (1% by biomass) on the Isle of May were delivered to guillemot chicks; most (91%) prey items were clupeids. Measurement of chicks during ringing indicated that fledgling weights were markedly lower than average.

On Skomer (**Wales**), productivity was relatively high compared with other sites, at 0.70 chicks fledged per pair, close to the long-term mean for the site. However, in the period 1999-2004 productivity was above 0.70 only once, yet between 1989-1998 success was only once below that figure, indicating a slight decrease in breeding success over the last seven years (Brown and Morgan 2004). Predation of eggs and chicks by large gulls was again noted. Breeding success at Durlston (**south-west England**) was again high, at 0.85 chicks fledged per egg (Morrison 2005).

3.24 Razorbill *Alca torda*

The number of razorbills in sample plots between 2004 and 2005 showed a pattern similar to that observed in common guillemot; increases were detected in some east coast regions with decreases in NW and SW Scotland. Whole-colony counts were broadly in line with these changes but, in addition, decreases were noted in NW England and NE Ireland. Mean productivity was, as it had been in 2004, markedly lower than the long-term average. Breeding success was low in the Northern Isles compared with other UK sites.

Breeding numbers (Tables 3.24.1 and 3.24.2, Figure 3.24.1)

Tables 3.24.1a and 3.24.1b show overall regional changes in razorbill numbers at sample plots and whole colonies between 2004 and 2005. Generally, multiple plot counts are preferred for monitoring annual population changes in razorbills as they smooth out day-to-day fluctuations in numbers of birds attending breeding colonies. It should also be noted that razorbills are difficult to census, because of their habit of nesting in crevices and under boulders, so there may be considerable variation in counts between individual observers. Note that Table 3.24b contains data from field counts of individuals and of apparently occupied sites; the two should not be compared directly without consultation with the authors.

Data from sample plots and whole-colony counts indicated that razorbill numbers in western Scotland and in regions bordering the northern half of the Irish Sea decreased since 2004. In **north-west Scotland**, sample plots on Handa held 17% fewer birds than in 2004, with a slight reduction noted in plots on Hirta, St. Kilda since 2003. However, the changes at both colonies were not statistically significant. A full survey of North Rona found 543 birds, 34% fewer than in 1998. On Haskeir, another remote island, numbers were similar between 2002 and 2005, with 141 and 150 birds recorded respectively. In **south-west Scotland**, sample plots on Colonsay also appear to indicate a decline since 2004 although numbers monitored using this method are small. Greater numbers are monitored by whole-colony counts, which also indicated a decrease since 2004; at Ceann a Mhara, Tiree, and at Mull of Galloway numbers fell by 26% and 32%, respectively. A large decrease between 2004 and 2005 was also recorded on Lunga, Treshnish Isles, although the 2005 count was similar to that in 2003 (1,247 birds). As this colony is counted in late June (slightly later than is recommended) it is possible that between year variation in the timing of breeding is responsible for these large fluctuations. Despite the short term declines, the trend in each region, as measured in plots on St. Kilda (north-west Scotland) and from a combination of plots and whole-colony data in south-west Scotland, is generally upward, with significant annual rates of increase.

Declines were also noted in **north-west England** and **north-east Ireland** between 2004 and 2005 although currently only one colony is monitored in each region. Numbers fell at St. Bee's Head by 42% to 153 birds, the lowest count there since 1986, and on the Isle of Muck for a second year in succession numbers decreased by approximately 30%.

In contrast to other western regions of the UK, numbers increased in **Wales**. In sample plots, the overall increase was slight, at 9%, with significant changes recorded at Stackpole Head (+38%, $t=4.340$, d.f.=8, $P<0.01$) and Skomer (+9%, $t=2.227$, d.f.=14, $P<0.05$). The changes recorded at Elegug Stacks, Skokholm, New Quay, Lochtyne and South Stack was all non-significant. Whole-colony counts at Elegug Stacks and Skomer indicated increases, of 16% and 27% respectively, which were larger than those recorded from sample plots, but at Stackpole Head the opposite occurred. A very large proportional increase was recorded on St. Margaret's Island, where numbers almost doubled from 120 birds to 226. Only at the small colony on Caldey, where numbers fell by one-third, was a decrease recorded. The regional trend, as measured either by plots or by whole-colony counts, generally shows a steady increase since 1990 with a highly significant annual rate of increase. The small colony at Durlston (**south-west England**) also increased between 2004 and 2005, by 23% to 53 birds.

Table 3.24.1 Population changes at monitored razorbill colonies, 2004-2005 (adults attending colony in first three weeks of June unless otherwise indicated). Regional totals of fewer than 50 birds are excluded. Trends for 1986-2004 are average annual rates of change shown by sample populations; in Orkney, NW Scotland and NE Scotland these are based on colonies monitored triennially. Significance of trends is indicated as: n.s. not significant, * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$. Further details of the calculation of trends are given in section 1.2.2.

3.24.1a Counts of adult razorbills in study plots, grouped regionally. Figures are summed means of 5-10 (occasionally 4) replicate counts of each of the study plots.

Region	1999	2003	2004	2005	% change since previous count	% annual change
SW Scotland ^a			55	48	-12.7	-
NW Scotland ^b			504	417	-17.3	-
NW Scotland ^c		202		189	-6.4	+4.0** 1990-2003
Shetland ^d			351	468	+33.3	+0.3 n.s. 1986-2004
N Scotland ^e	810			1,643	+102.8	+2.3 n.s. 1986-2005
NE Scotland ^f			238	238	0.0	+2.2 * 1986-2004
SE Scotland ^g			107	127	+18.7	+3.2*** 1986-2004
Wales ^h			2,779	3,030	+9.0	+3.7*** 1986-2004

Colonies: ^a Colonsay; ^b Handa; ^c St. Kilda; ^d Hermaness, Eshaness, Burravoe, Noss, Troswick Ness, Sumburgh Head, Fair Isle; ^e Caithness; ^f Fowlsheugh; ^g St. Abb's Head; ^h Skomer, Skokholm, New Quay, Lochtyn, Elegug Stacks, Stackpole Head NNR, South Stack.

3.24.1b Whole-colony counts of razorbills, grouped regionally. Trends given for Wales are from whole-colony counts at Skomer, Skokholm, Stackpole and Elegug Stacks.

Region	2004	2005	2004-2005 % change	% annual change
SW Scotland ^a	1,022	730	-28.6	+2.9 * 1986-2004
Shetland ^b	813	1,022	+25.7	-
SE Scotland (birds) ^c	3,313	4,109	+24.0	+3.9*** 1986-2004
SE Scotland (AOS) ^d	594	525	-11.6	-
NE England (AOS) ^e	236	303	+28.4	-
SW England ^f	43	53	+23.3	-
Wales ^g	5,790	7,258	+25.4	+3.0*** 1986-2004
NW England ^h	262	153	-41.6	+1.8 * 1986-2004
NE Ireland ⁱ	573	415	-27.6	-

Colonies: ^a Ceann a Mhara, Mull of Galloway; ^b Noss; ^c Isle of May; ^d Inchcolm, Inchkeith, Craigleith, Fidra, The Lamb, Bass Rock; ^e Farne Islands, Boulby; ^f Durlston; ^g Caldey, Barafundle-Giltar; Stackpole Head NNR, Elegug Stacks plus nearby coast, Skomer, St Margaret's Island; ^h St. Bee's Head; ⁱ Isle of Muck.

Increasing numbers were also noted in regions bordering the North Sea. In **Shetland**, after four successive years of decline, numbers in sample plots had increased by 33% overall since 2004. Increases were noted at all colonies with significant changes occurring at Sumburgh Head (31%, $t=3.657$, $d.f.=8$, $P<0.01$), Troswick Ness (38%, $t=3.960$, $d.f.=8$, $P<0.01$) and Fair Isle (62%, $t=3.993$, $d.f.=14$, $P<0.01$). However, as with guillemots, this increase may be due higher colony attendance in 2005 rather than due to an actual increase in the breeding population (Heubeck 2005). Whole-colony counts were also carried out at two sites. On Noss, 1,022 birds were recorded, an indication that numbers had recovered slightly since 2004 when it was found that numbers declined by 59% since 2001 to 813 birds (Sykes and Bliss 2005). On Fair Isle, complete surveys in 1999 and 2005 recorded 3,599 and 3,421 birds respectively indicating little change over the period (Shaw *et al.* 2005). However, the plot data presented above suggests otherwise although it should be noted that the sample plots only hold approximately 2% of the islands razorbills. The regional index shows no noticeable trend over the long-term.

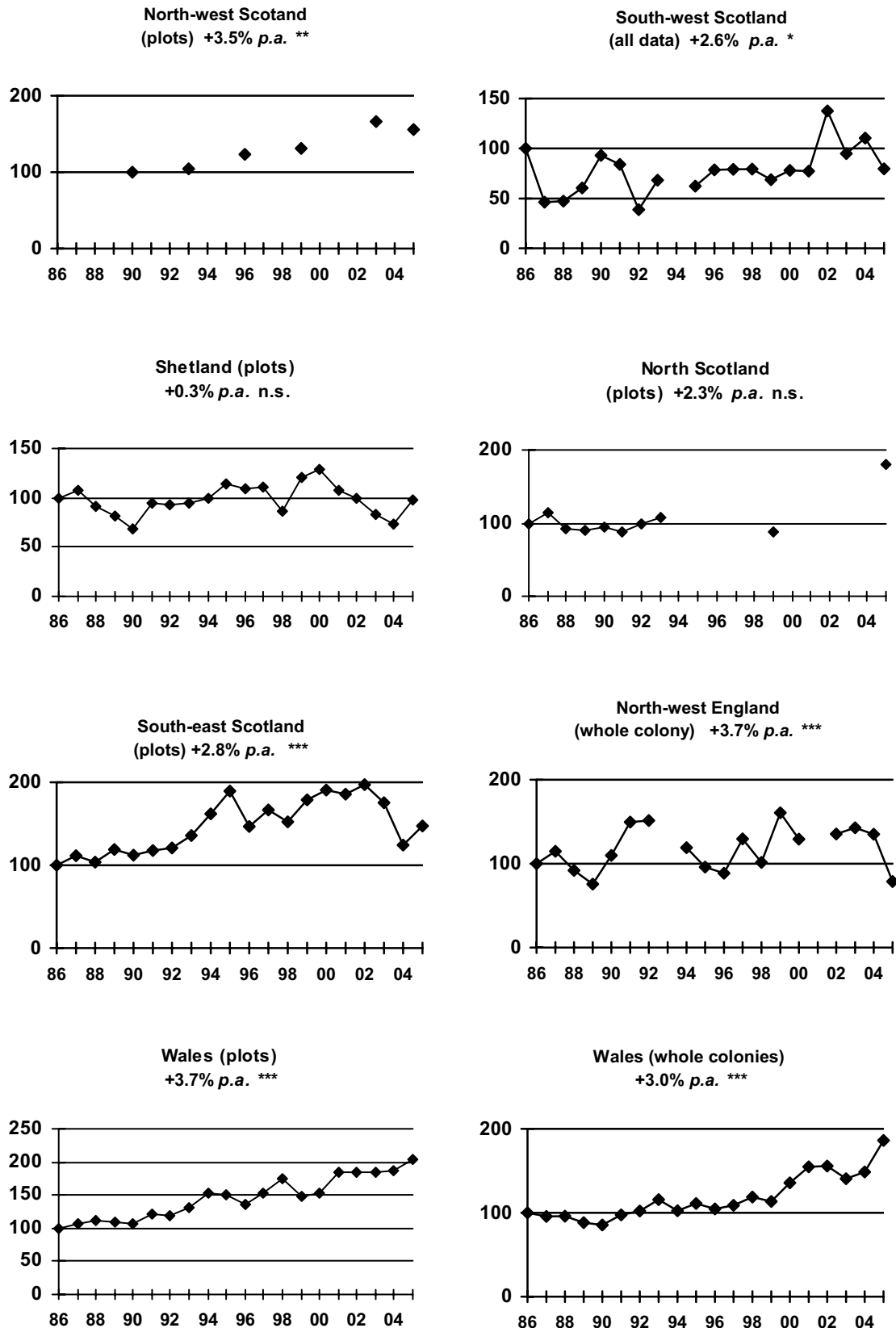


Figure 3.24.1 Regional population indices for breeding razorbills in various regions, 1986-2005 (counts of adults in June). Average annual rates of change were calculated by regression of natural log of index against year (see section 1.2.2. for details). Statistical significance of trends indicated as: n.s. not significant, * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

Table 3.24.2 Population changes of razorbills 2004-2005 and 1986-2004 at selected sites referred to in the text. P\W indicates plot or whole-colony counts.

Region/Site		2004	2005	2004-2005 % change	1986-2004	
					Mean (\pm s.d.)	No. years
SW Scotland						
Colonsay	P	55	48	-12.7	37 (13)	8
Ceann a Mhara	W	561	417	-25.7	381 (105)	5
Lunga	W	2,064	1,127	-45.4	1,082 (434)	12
Mull of Galloway	W	461	313	-32.1	345 (104)	16
NW Scotland						
Handa	P	504	417	-17.3	515 (56)	7
Shetland						
Noss	P	57	78	+36.8	69 (15)	17
Noss	W	813	1,022	+25.7	1,311 (554)	5
Hermaness	P	26	30	+15.4	57 (17)	17
Eshaness	P	42	46	+9.5	52 (16)	19
Troswick Ness	P	13	18	+38.5	18 (4)	19
Sumburgh Head	P	144	189	+31.3	208 (37)	19
Burravoe	P	11	13	+18.2	12 (3)	14
Fair Isle	P	58	94	+62.1	66 (5)	6
Orkney						
Papa Westray	P	22	32	+45.5	47 (41)	3
NE Scotland						
Sands of Forvie	W	35	31	-11.4	31 (8)	8
Fowlsheugh	P	238	238	0.0	242 (42)	6
SE Scotland						
Inchkeith	W	54	49	-9.3	59 (8)	14
Craigeleith	W	171	132	-22.8	119 (41)	13
Fidra	W	101	69	-31.7	93 (24)	15
Lamb	W	105	73	-30.5	74 (30)	10
Isle of May	W	3,313	4,109	+24.0	3,023 (798)	19
Bass Rock	W	158	198	+25.3	127 (57)	9
St. Abb's Head	P	107	127	+18.7	163 (25)	16
NE England						
Farne Islands	W	224	277	+23.7	181 (33)	10
Boulby Cliffs	W	12	26	+116.7	12 (6)	7
SW England						
St. Aldhelm's - Durlston	W	43	53	+23.3	24 (12)	9
Wales						
Caldey	W	38	25	-34.2	32 (27)	11
Elegug Stacks	P	402	431	+7.2	309 (81)	17
	W	678	788	+16.2	616 (113)	12
Stackpole Head	P	45	62	+37.8	62 (12)	9
	W	93	112	+20.4	122 (58)	12
Skokholm	P	166	172	+3.6	158 (10)	2
New Quay	P	210	202	-3.8	189 (29)	2
Lochtyn	P	24	26	+8.3	24 (-)	1
Skomer	P	1,131	1,232	+8.9	847 (219)	18
	W	4,546	5,759	+26.7	3,434 (733)	19
South Stack	P	802	905	+12.8	541 (126)	19
St Margaret's Island	W	120	226	+88.3	133 (59)	13
NW England						
St. Bee's Head	W	262	153	-41.6	240 (48)	17
NE Ireland						
Isle of Muck	W	573	415	-27.6	550 (223)	6

In **Orkney**, a large proportional increase occurred in sample plots on Papa Westray, where few razorbills are present, but the change was not statistically significant. On Copinsay, a whole-colony count found 322 birds (27% fewer than when last surveyed in 1999), though the 2005 count was made very early in the season (18 May) and may well not be comparable.

In **north Scotland**, razorbill numbers in sample plots doubled since 1999. Increases were recorded at An Dun (187%, to 587 birds), Iresgeo (97%, to 796 birds), Badbea (58%, to 123 birds) and Skirza Head (52%, to 64 birds) with a decrease at Inverhill (11%, to 72 birds) (Swann 2005). However, only the changes at An Dun ($t=26.836$, d.f.=3, $P<0.001$) and Iresgeo ($t=3.919$, d.f.=3, $P<0.05$) were statistically significant. The regional trend appeared to be stable until 1999 although monitoring was infrequent in the last decade. In **north-east Scotland**, no change was noted in sample plots at Fowlsheugh and the number at the small colony at Sands of Forvie was similar to that recorded in 2004.

Numbers also increased in sample plots in **south-east Scotland**, where a steep decline was evident between 2002 and 2004, although the regional trend has generally been upward since the late 1980s. Plots at St. Abb's Head held 19% more birds than in 2004 (Rideout 2005), a significant increase ($t=2.626$, d.f.=12, $P<0.05$). A whole-colony count on the Isle of May recorded a similarly sized increase (24%, to 4,109 birds). However, at four islands in the Firth of Forth (Inchkeith, Craigleith, Fidra and The Lamb) the number of occupied sites recorded declined by between 9-32% since 2004, although the Bass Rock held 25% more sites. In **north-east England**, 28% more occupied sites were recorded than in 2004; increases were noted on the Farne Islands and in the small colony at Boulby Cliffs, both of which recorded their highest numbers since regular monitoring commenced in 1995.

Breeding success (Table 3.24.3)

It should be noted that the intensity of monitoring at the colonies listed in Table 3.24.3 varies and that this may affect estimates of breeding performance (Walsh *et al.* 1995). Direct comparisons between colonies are therefore inadvisable without prior consultation with the authors.

Mean productivity of razorbills across seven colonies monitored in 2005, at 0.52 chicks per pair (s.e. ± 0.10) was, as it had been in 2004, markedly lower than the long-term (1986-2004) mean of 0.66 (s.e. ± 0.02) recorded from between one and seven colonies annually. Comparison of the mean productivity across six colonies monitored in both 2004 and 2005 showed no significant difference.

In 2004, productivity was especially low in the Northern Isles and this was again the case in 2005. On Fair Isle (**Shetland**), although 0.44 chicks fledged per pair was a marked increase from the complete failure of 2004, success was still well below average. In 15 years of monitoring at this site the three years with the lowest breeding success have all occurred since 2003. Chicks were noted as being underweight for their stage of development and five of 31 chicks weighed twice, approximately one week apart, actually lost weight (Shaw *et al.* 2005). Elsewhere in the region, birds on Foula fledged 0.45 chicks per pair but success has generally been low at this site although few years are available for comparison. On Papa Westray (**Orkney**), there was almost complete failure – only one chick fledged from 24 monitored sites. Again, few years' data were available for comparison, but razorbills do not appear to have high levels of success at this colony.

Table 3.24.3 Razorbill breeding success, 2004-2005 and colony averages: estimated number of chicks fledged per site regularly occupied by a pair or per pair laying. Superscript figures for individual colonies are numbers of study plots. Where three or more study plots are monitored, colony figures are mean and standard error across all plots.

Colony	Colony average 1986-2004			2004 chicks fledged/pair			2005 chicks fledged/pair			2004-2005 change	
	Years	Mean	\pm s.e.	Sites ⁿ	Mean	\pm s.e.	Sites ⁿ	Mean	\pm s.e.	Mean	\pm s.e.
Foula	2	0.30	\pm 0.01	-	-	-	47 ¹	0.45	-	-	-
Fair Isle	14	0.56	\pm 0.05	84 ¹	0.00	-	102 ¹	0.44	-	+0.44	-
Papa Westray	2	0.34	\pm 0.02	17 ¹	0.35	-	24 ¹	0.04	-	-0.31	-
North Sutor	8	0.77	\pm 0.04	18 ¹	0.89	-	17 ¹	0.71	-	-0.18	-
Isle of May	19	0.67	\pm 0.02	190 ⁴	0.54	\pm 0.05	200 ⁴	0.57	\pm 0.05	+0.03	-
Farnes	9	0.67	\pm 0.09	30 ¹	0.70	-	21 ¹	0.86	-	+0.14	-
Skomer	12	0.57	\pm 0.03	386 ⁴	0.52	\pm 0.02	328 ⁵	0.57	\pm 0.04	+0.05	-
Total ^{no. colonies}	-	-	-	722 ⁶	0.50	\pm 0.12	739 ⁷	0.52	\pm 0.10	0.03 ⁶	\pm 0.11

Colonies outside the Northern Isles were more successful. At North Sutor (**north Scotland**) breeding success was lower than in 2004 and below average although over the long-term this was the most successful colony in the UK. Success was also high at the Farne Islands (**north-east England**); 0.86 chicks fledged per site was the second highest value recorded at the colony and subsequently well above the site mean. Lying between these two colonies, productivity on the Isle of May (**south-east Scotland**) at 0.57 chicks per pair was below average. As with guillemots at this site, the timing of breeding was late, with the first egg laid on 4 May. Most losses occurred at the egg stage but chick losses were also higher than normal. This was unusual, because no unattended chicks were recorded and adults appeared to have little difficulty finding food as sandeels, virtually all 0-group, comprised 93% of 774 feeds. This was in contrast to 2004, when 74% of the loads of fish brought to chicks consisted of clupeids (more than twice the previous highest annual proportion). On Skomer (**Wales**), breeding success was only slightly higher than in 2004 and was equal to the long-term mean (Brown and Morgan 2005).

3.25 Black guillemot *Cepphus grylle*

Numbers of pre-breeding adults recorded in Shetland and Orkney were stable between 2004 and 2005, although numbers in Shetland declined since 2000. Trends since the early 1980s indicate numbers nearly halved in Orkney, with no net change in Shetland. The relatively few data available indicated it was a productive breeding season with success above, or close to, average at most sites.

Breeding numbers (Table 3.25.1, Figure 3.25.1)

Unless otherwise stated, all population figures refer to early morning spring counts of individuals in adult plumage (Walsh *et al.* 1995).

In **Shetland**, total numbers along 14 stretches of coast monitored in 2004 and 2005 showed virtually no change between the years. A larger sample, covering 16 stretches previously surveyed in 2000, suggest that numbers fell by 16% to 2,193 birds (Heubeck 2005). Although no statistically significant overall change is apparent in the regional trend, there is an indication of a slight decline since 1995. When examining individual stretches of coast this general pattern is mirrored in many stretches;

however, long-term declines are apparent at some, e.g. Watsness, Aithsetter and, particularly, Mousa, where numbers have fallen from 347 in 1987 to 108 at present (Heubeck 2005). No monitoring was carried out in Yell Sound in 2005, where numbers had generally increased since 1985 (Mavor *et al.* 2003).

Table 3.25.1 Population changes at monitored black guillemot colonies, 2004-2005. Units are adults in breeding habitat in early morning, late March-early May. Trends for periods indicated are average annual rates of change shown by sample populations. Significance of trends indicated as: n.s. not significant, *** $P < 0.001$. For further details of the calculation of these trends see section 1.2.2.

Region/site	2004	2005	2004-2005 % change	% annual change
Shetland ^a				
Shetland excl. Yell Sound	1,890	1,917	+1.4	-0.6 n.s. 1985-2004
Orkney ^b	854	843	-1.3	-3.6 *** 1983-2004

Colonies: ^a Fetlar (east coast), Lunning, Leveanap, Mousa, Noss, Kirkabister, Aithsetter, West Burra, Kettle Ness, Boddam-Virkie, Hillswick, Tingon (east), Foula (east coast), Fair Isle (east coast); ^b North Hill, Holm of Papa Westray, North Ronaldsay.

In **Orkney**, there was also little change in overall numbers between 2004 and 2005, where a 13% decrease at Papa Westray (318 to 277 birds) was offset by an increase at the larger colony on North Ronaldsay (536 to 566 birds). A general downward trend was apparent in the region between 1983 and 2000 but numbers appear to have stabilised since then.

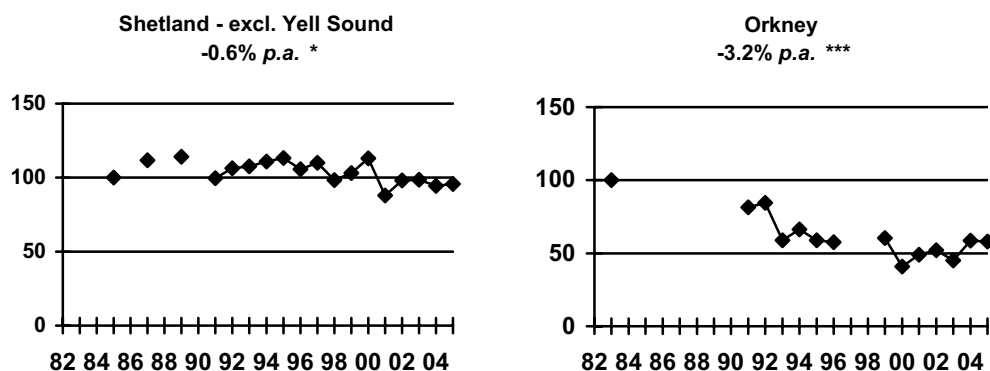


Figure 3.25.1 Regional population indices for breeding black guillemots, 1983-2005. Based on counts of adults in breeding habitat late March-early May. Average annual rates of change were calculated by regression of natural log of index against year (see section 1.2.2. for details). Statistical significance of trends indicated as: n.s. not significant; * $P < 0.05$, *** $P < 0.001$.

In the study area of the Mink-Seabird Project, which stretches from Mallaig to Tarbert (**north-west and south-west Scotland**), adult black guillemots were seen at 24 sites. Surprisingly few birds were seen around Craro, Gigha, where 81 were recorded in June 1997 and 117 in April 2000. Only 16-20 adults were found there in 2005, with mink strongly suspected as causing the decline; the remains of at least one adult were cached under a rock, as were fragments of shag and herring gull eggs (Craig 2005). Elsewhere, numbers on Eigg totalled 265 birds, an increase of 9% since 2002 (J. Chester, pers. comm.). On Canna, 47 birds were counted in early July although, as this is outside the recommended count period for the species, this may be an underestimate of the true number. However, comparison with previous data, also collected in late June/early July, indicates a decline, as the 2005 count lies well below the 1986-2004 mean of 76 birds (s.d. ± 27 , $n=18$) and prior to 1991 at least 100 birds were present in each year (range 100-137).

On the east coast of the UK mainland, black guillemot is confined to a handful of sites in Scotland (Mitchell *et al.* 2004). At Tronach Head (**north-east Scotland**), a small colony toward the southern limit of the range, numbers have increased in recent years; 4 birds were present in 2003, 7 in 2004 and 12 in 2005 (M. Cook, pers. comm.). Similar numbers were present at nearby Portknockie.

Breeding success (Table 3.25.2)

Each year the outcome of several nests at a number of sites remains unknown, but despite these uncertainties black guillemots throughout Britain and Ireland appear to be producing in excess of one chick per pair each year.

In **Orkney**, breeding success was relatively high at all three colonies although slightly below average at North Ronaldsay and Swona.

Table 3.25.2 Breeding success of black guillemots, 2004-2005 and 1986-2004. Figures are the number of chicks fledged per active site where an egg or apparent incubation was recorded. Figures in parentheses are the number of active sites from which the breeding success estimates were derived.

Region/site	2004	2005	1986-2004 mean	
			Mean (\pm s.e.)	No. of years
Orkney				
North Ronaldsay	\leq 1.50 (10)	1.37 (27)	1.42 (0.12)	9
Auskerry	1.12 (32)	1.42 (26)	1.30 (0.06)	10
Swona	1.29 (7)	1.42 (12)	1.47 (0.15)	4
NE Ireland				
Old Lighthouse Island	c.1.26 (25)	1.31 (26)	1.06 (0.08)	15
Mew Island	2.00 (1)	2.00 (2)	2.00 (-)	1
SE Ireland				
Rockabill	1.16 (49)	1.77 (40)	1.18 (0.04)	7

Sites monitored in Ireland were also relatively successful in 2005. On Old Lighthouse Island (**north-east Ireland**), fledging success from 26 nests was 1.31 chicks per nest, well above the average for the fourth successive year. On nearby Mew Island, where breeding is a recent occurrence, up to six sites were occupied and, although most were inaccessible, two that could be reached each fledged two chicks. On Rockabill (**south-east Ireland**) productivity, at 1.77 chicks fledged per nest, was extremely high, far above the previous most successful season in 2003 when 1.32 chicks were fledged per nest.

3.26 Atlantic puffin *Fratercula arctica*

Comparison of counts of apparently occupied burrows in 2005 with previous years' data indicates that numbers are stable on Lunga (SW Scotland) but declining on Ynys Gwylan Fawr (Wales). Spring counts of adults ashore estimated colony size at several sites; numbers were similar to 2004 on Skomer and Skokholm but there was evidence of a decline on Handa. Mean breeding success was higher than in 2004, increasing significantly at colonies monitored in both years, but still below the long term mean. However, productivity on Dun, St. Kilda was extremely low, probably due to low food availability.

Breeding numbers

Only two colonies were systematically surveyed in 2005, although at a number of others spring counts of adults ashore were again carried out. On Lunga (**south-west Scotland**), the population was estimated at 2,082 AOB plus 759 individuals. Combining units, assuming that one individual corresponds to one AOB (Lloyd *et al.* 1991, Mitchell *et al.* 2004) would suggest a population of 2,841 AOB, similar to that derived in 2004 (2,787 AOB) although the ratio of AOB to individuals is quite different between the two years (1:0.36 vs. 1:0.81 respectively). Since 2001, annual estimates of the size of this colony have been between 2,100 and 2,800 AOB (except in 2003 when the colony was estimated at 1,154 AOB, attributed to low attendance by puffins that year). On Ynys Gwylan Fawr (**Wales**), 535 AOB were counted, 22.4% fewer than in 2004 and *c.* 50% fewer than burrow counts in 2000 and 2001 (Stansfield 2005). The colony showed little sign of recovering since the decline in numbers noted between 2001 and 2003, although current figures are on a par with those recorded in 1998-99.

Spring counts of individuals ashore prior to egg-laying, which provide a broad indication of colony size (Walsh *et al.* 1995), were carried out on Handa (**north-west Scotland**) and Skomer and Skokholm (both **Wales**). Numbers on Skomer (10,717) and Skokholm (4,510) were similar to those recorded in 2004 (10,688 and 4,308 individuals respectively), but only 244 were counted on Handa, where counts have declined by an average of 24% per annum since 2001, when 735 individuals were recorded ashore.

Breeding success (Table 3.26.1)

Mean breeding success in 2005, at 0.66 chicks per occupied burrow, was slightly higher than in 2004, and higher at all four colonies where comparison could be made with the previous year, but still below the long-term mean of 0.72 (s.e. ± 0.02), recorded in two to seven colonies annually from 1986-2004.

On Dun, St. Kilda (**north-west Scotland**), monitoring of breeding success was undertaken for the first time since 1994 (Money 2005). Breeding success from 96 study burrows was very low, at 0.26 chicks fledged per egg laid (1990-1994 mean 0.72, s.e. ± 0.01), although this should be regarded as a maximum value. Many dead chicks, both downy and fully-feathered, were found at burrow entrances throughout the colony. On examination, corpses appeared to have little fat which, coupled with no signs of depredation, suggested that starvation was the cause of mortality. Many empty burrows had a tangle of pipefish *Syngnathus sp.* at or within the burrow entrance and many live chicks had pipefish hanging from their mouths. Only three non-sandeel prey items were found in the colony, suggesting that adults had difficulty finding high quality food for their young. However, fishermen reported seeing an abundance of sandeels in local waters, so it would seem that the appropriate size class was not available to puffins during chick-rearing. A proportion of chicks still alive on the final visit to the sample plot were small and downy and probably also starved before fledging (Money 2005).

On Fair Isle (**Shetland**), breeding success was slightly higher than in 2004 and close to the long-term mean (0.69, s.e. ± 0.03). An all-day feeding watch in early July found that the main food brought back to chicks was small sprats (61% of 251 loads) (Shaw *et al.* 2005). Food samples obtained in mid-July

were comprised mostly of sandeels (54% by number), sprat (36%) and gadoids (7%), with some pipefish present (3%), but many of the last species were discarded at burrow entrances. However, the mean length of sandeels (59.1mm) was below average and the mean weight of samples (5.7g, all fish), although similar to that recorded between 1998-2003, was considered low compared with samples taken between 1990-1997, which had a mean of 8.6g (Shaw *et al.* 2005) .

On the Isle of May (**south-east Scotland**), breeding was five days later than in any year since observations started (Harris *et al.* 2005). Breeding success, at 0.71 chicks per egg laid, was higher than in 2004 but still one of the lowest values recorded and below the long-term mean (0.75, s.e. ± 0.02). Sandeels made up 92% by number and 71% by weight of the diet of chicks, with most of the remainder comprising of sprats. The mean load size (9.5g) was close to the long-term average and, as in 2004, the number of fish per load (13.4) was double the long-term average. Atlantic puffins nesting on the Farne Islands (**north-east England**), were highly successful, fledging 0.84 chicks per egg laid. In contrast to 2004, birds nesting on the Outer Farnes were almost as successful as those on the Inner Farnes, despite two spells of heavy rainfall which caused widespread flooding. Flooding during the previous breeding season resulted in puffins on the Outer Farnes fledging half the number of young as those on the Inner Farnes. There was no evidence from the Farnes to suggest a problem with sandeel availability in 2005 (Walton *et al.* 2005).

Table 3.26.2 Atlantic puffin breeding success, 2004-2005. Estimated number of chicks fledged per egg or occupied burrow (Skomer). Superscript indicates number of colonies.

Colony	2004 chicks fledged/pair				2005 chicks fledged/pair				2004-2005 change	
	Burrows	Range	Mean	\pm s.e.	Burrows	Range	Mean	\pm s.e.	Mean	\pm s.e.
Fair Isle	40	-	0.63	-	43	-	0.67	-	+0.04	-
Dun, St. Kilda	-	-	-	-	96	-	0.26	-	-	-
Isle of May	196	-	0.60	-	184	-	0.70	-	+0.10	-
Farne Islands	100	-	0.62	-	100	-	0.85	-	+0.23	-
Skomer	121	-	0.63	-	94	-	0.84	-	+0.21	-
Total	457 ⁴	0.60-0.63	0.62	± 0.01	517 ⁵	0.26-0.85	0.66	± 0.11	+0.14⁴	$\pm 0.04^*$

In **Wales**, breeding success on Skomer, where it appeared to be another early season, was high: 0.84 chicks fledged per occupied burrow was well above the long-term mean of 0.75 (s.e. ± 0.02). The first adults recorded on land carrying fish were noted on 25 May (*c.f.* 3 June on the Isle of May). Feeding watches, in which the number of successful burrows and hence productivity is determined, were thus carried out earlier than usual in 2005. In 2004, another year of early breeding, watches were carried out later than optimal so some successful burrows were undoubtedly mis-classified as 'failures' which contributed to the low success recorded that year (Perrins 2004, 2005). There was no evidence of low food availability.

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