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Seabird numbers and breeding success in Britain and Ireland, 2004

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Contents

Summary

Some findings of particular note in 2004 are summarised below:

- The breeding season of seabirds in 2004 was the least productive on record, particularly so in the Northern Isles and in many colonies on the east coast of Britain. The available evidence suggests that severe food shortage was the primary causative factor.

- Breeding success of **red-throated divers** in Shetland was well below average, with total failure on Yell. In contrast, those on Orkney were very successful, due in part perhaps to low predation rates from great skuas (which failed early and abandoned territories).

- The number of breeding **northern fulmars** in most regions continued the decline that started in the mid-late 1990s. Breeding success was below the long-term mean in most regions, particularly so in south-east Scotland.

- Breeding success of **Manx shearwaters** was low on Rum, raising concerns that predation by brown rats was impacting upon this important colony, as they have to such devastating effect on adjacent Canna. On Lundy breeding was confirmed for the first time in 50 years (although few surveys have been undertaken in that period).

- The number of **European shags** that built nests in 2004 declined in some regions, likely due in some cases to food shortages. Breeding success was well below average, though colonies on the west coast did better than those on the east. Particularly low success was recorded in south-east Scotland and north-east England, due to bad weather and low availability of sandeels.

- The number of **Arctic skua** territories held in Shetland decreased by nearly 50% compared with 2003, and a near breeding failure occurred there, and those in Orkney fared only slightly better. **Great skuas** were extremely unproductive on Shetland (where interspecific depredation was noted) but less so on Orkney.

- Predation my mink continued to depress breeding success of **mew-, herring-, and lesser black-backed gulls** and of **common** and **Arctic terns** in study sites in western Scotland, though great black-backed gulls appeared to be unaffected. The number of **great black-backed gulls** breeding on Orkney declined by 25% since 2003 and breeding success there appeared to be low.

- Poor weather and food shortages severely depressed breeding success of **sandwich-, common-, Arctic-** and **little terns** in the Northern Isles and along the east coast of Britain. The total breeding population of **roseate terns** in Britain and Ireland reached a 25 year high, but its breeding range contracted further, and none nested in Wales in 2004.

- **Black-legged kittiwakes** were severely affected by apparent low availability of sandeels. None were fledged from several study colonies in Orkney, and those in Shetland fared only marginally better. Many colonies on the east coast of Britain, and in Wales, were also unproductive. The population index of most regions was at its lowest level in the 19 years of the SMP.

- Numbers of **common guillemots** in study plots declined in most regions between 2003 and 2004 and attendance at many colonies was notably low, due to food shortages causing parent birds to spend longer periods foraging at sea. Mean productivity was extremely low; on Fair Isle no chicks fledged at all, which is unprecedented. Few sandeels were fed to chicks and predation on them from great skuas exacerbated the situation.

1 Introduction

This is the sixteenth 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 2004 are summarised and compared with results from previous years, primarily 2003, 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 informati 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 Orkney and St Kilda was conducted in 2003. 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), has recently been 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 guillemots 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 2004 (Wanless *et al.* 2004, 2005a, b); NB Channel Islands will be counted in 2005 – figures shown here are from 1999 (Mitchell *et al.* 2004). [3] Inland colonies were not surveyed during Operation Seafarer or SCR. A [4] Roseate tern figures are from 2004. [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.

Species	*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	5,950	0	36,111	260,607	+89	+40
Great cormorant	3,626	2,896	1,699	134	115	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
Common 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	73	0	0	0	8	743	828	-65	+51
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

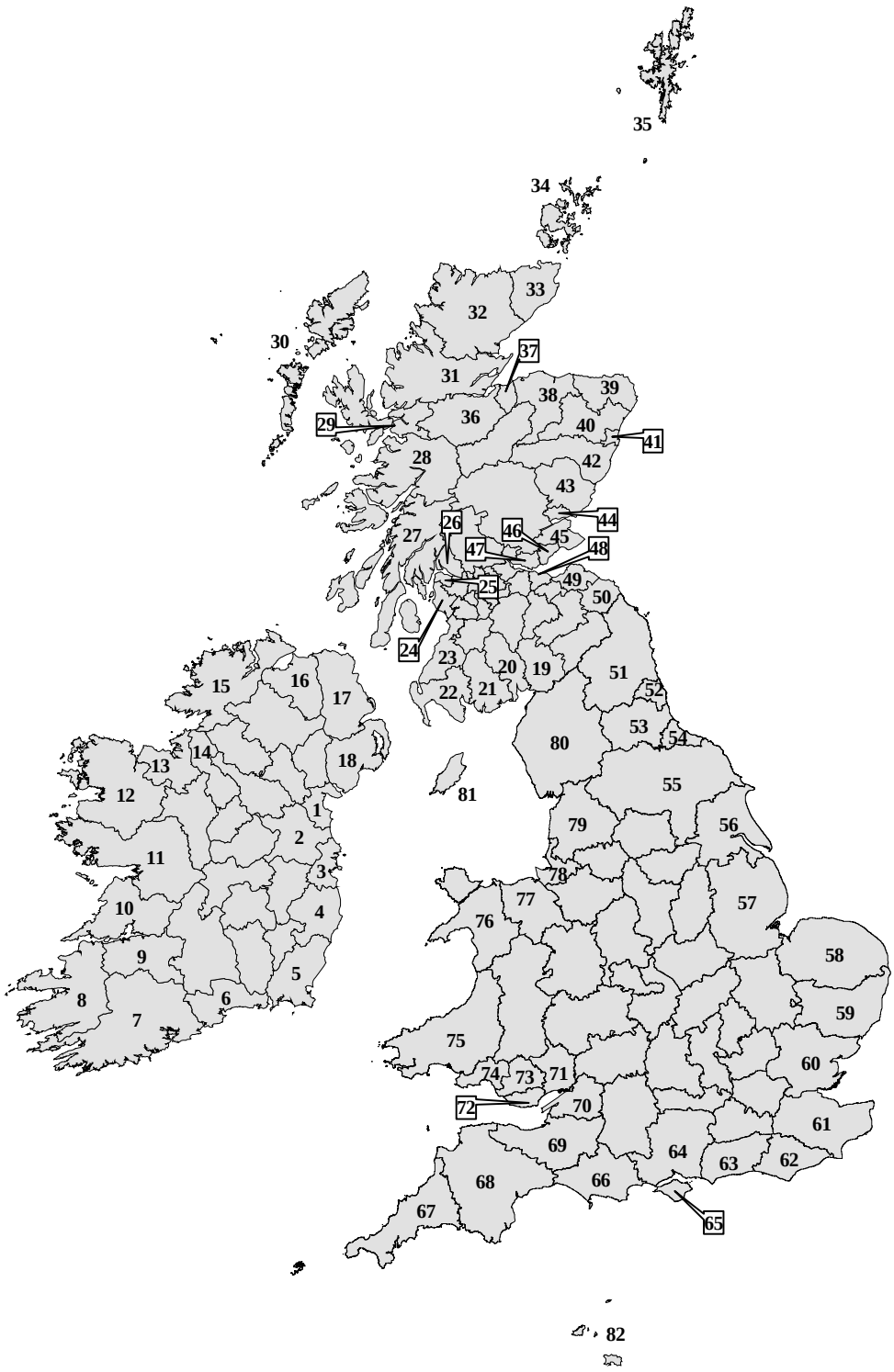

Figure 1.2.1 Coastal counties and districts of Britain and Ireland. See Table 1.2.1 for details of the coastal regions (combinations of counties or districts) used in this report.

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 (32)	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 2004 breeding season

April was generally warm (the 13th warmest in the last 100 years) but dull – at least in Scotland – and wet. In mid month a depression from Iceland brought the lowest April pressures for a decade over many parts of Britain, with associated cool, wet and windy weather. May started cool and wet though high pressure dominated for most of the rest of the month, with mostly warm weather and occasional thunderstorms. June started mostly warm but gales, heavy rain and very low temperatures moved eastward on the 23rd, causing severe losses at some seabird colonies in north-east England and eastern Scotland during a vulnerable time in their breeding season. Unsettled weather – especially in Scotland – prevailed to the end of June. July started with a deep depression to the west of Scotland, bringing cool and showery weather to the whole region, then southern Britain was affected by a similar system from the south. The second half of July was generally warm but cloudy (Eden 2004a-d).

Timing of breeding, where this was reported, was generally late or very late for cliff-nesters in Scotland and eastern England, but near to normal in south-west Britain. On Fair Isle, Shetland, common guillemots were very late in returning to the colony, with the first eggs laid on 13 May. Elsewhere in Shetland, common guillemots, European shags and black-legged kittiwakes bred late at Sumburgh Head, perhaps due to low availability of sandeels in surrounding waters early in the season. The first common guillemot egg there was noted, as on Fair Isle, on 13 May, and the median laying date was some three weeks later than in 2001 (Heubeck 2004); on Foula the first guillemot egg was not seen until 31 May (S. Gear, pers. comm.). Red-throated divers too were late in breeding in Shetland in 2004, further circumstantial evidence of a spring sandeel shortage in the region. Late breeding and slow growth of chicks was reported for northern fulmar (Brindister Loch) and European storm petrel (on Mousa), suggesting that species that feed on plankton may have experienced food shortages (Okill 2004b). On the Isle of May (south-east Scotland) European shags, black-legged kittiwakes and common guillemots all bred late – exceptionally so for kittiwakes, the first eggs of which were not seen until 22 May and the first fledging occurred on 27 July (Harris *et al*. 2004). In north-west Scotland, on Handa the first common guillemots fledged on 15 July – extremely late (Williams 2004); on Canna auks, shags and kittiwakes nested later than usual (Swann 2004a). In contrast, there was evidence that timing was normal or slightly early for colonies around western and southern coasts of Britain. An earlier than average season was reported for shags on Ailsa Craig (south-west Scotland), where they had eggs in early March (B. Zonfrillo, pers. comm.). On Skomer (Wales), there was some evidence that Atlantic puffins bred early in 2004, as in 2003 (Perrins 2005), and on Bardsey (Wales), razorbill chicks appeared to be fairly early, or at least growth rates high (Stansfield 2004). In south-west England, the timing of breeding of common guillemots at Durlston Head and Berry Head was around normal (Morrison 2004; S. Ayres, pers. comm.).

The breeding season of seabirds in 2004 was the least productive on record, particularly so in the Northern Isles and in many colonies on the east coast of Britain. Although storms in late June contributed to nest and chick mortality, the available evidence suggests that severe food shortage was the primary causative factor. In particular, very few sandeels were reported to have been fed to chicks, the parents often feeding them fish of lower food value, such as gadoids. Of additional interest was the fact that common guillemots also fared poorly in 2004; for example, at the large colony on Fair Isle not a single guillemot chick fledged, which is unprecedented. This species dives, so may gain access to a wider variety of prey compared with surface feeders such as kittiwakes and therefore has usually been unaffected by previous food shortages. This points to a more severe shortage in 2004 than occurred in previous years of low food availability. Also of note was the near total failure of kittiwakes in Orkney, which in all previous years of the SMP have been significantly more productive than those in Shetland. Since Shetland waters are 'supplied' with larval sandeels by currents that carry fish north-eastwards from their spawning ground around Orkney, this is further evidence of a more widespread and severe sandeel shortage in the region. Some seabird colonies, however, including some in eastern Scotland, were fairly productive in 2004, so food must have been locally available.

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, the number of nesting pairs was similar to 2003. However, breeding success was lower than in 2003 and was below the long-tern mean. At Hermaness and Foula success was close to average for those sites, but divers on Yell failed completely. In the Shetland Ringing Group's study area, 2004 was considered the poorest season since 1980; the number of successful pairs was the lowest on record and mean brood size at fledging was the lowest for 15 years. In Orkney, productivity was above average with an unusually high proportion of broods containing two chicks. In NW Scotland, divers on Handa had high levels of success but low productivity was recorded on Rum, Coll and Eigg.

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

In **Shetland**, 41 pairs were found in regularly monitored areas, similar to the number recorded in 2003, but overall success was far lower than that year and was below the long-term mean. Breeding success was low at all sites, except at Hermaness where divers were far more productive than in other areas of Shetland (Wilson 2004). On Fetlar, delayed nesting by many pairs was a notable feature in the early part of the breeding season. Subsequently, breeding success was the lowest since 1990. At many study lochs piles of breast feathers were found on the banks which, coupled with a dead diver chick found next to a great skua nest, initially suggested the low productivity was due to predation. However, evidence from elsewhere on the island and other parts of Shetland indicated that many chicks died of starvation and were then scavenged by skuas which were also experiencing food shortage (French and Smith 2004, Okill 2004a). On Foula, success was half that recorded in 2003, although close to the long-term mean for this relatively unproductive site. All failures occurred before or during incubation; four pairs that successfully hatched chicks fledged one chick each (S. Gear, pers. comm.). On Yell, all nests failed for the first time since monitoring began in 1986 (M. Smith, pers. comm.).

Table 3.1.1 Breeding success of red-throated diver, 2003 and 2004, and 1986-2003: 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	2003		2004		1986-2003	
	Pairs	Fldg/pair	Pairs	Fldg/pair	Mean (±s.e.)	No. of years
Shetland						
Hermaness	5	0.20	6	0.83	0.91 (±0.09)	18
Fetlar	19	0.63	20	0.25	0.55 (±0.06)	18
Yell	7	1.00	6	0.00	0.56 (±0.08)	15
Foula	8	0.88	9	0.44	0.47 (±0.06)	18
Sample total	39	**0.69**	41	**0.46**	**0.60 (±0.04)**	18
Orkney						
Hoy	64	0.62	56	0.95	0.57 (±0.03)	15
Rousay	2	0.50	-	-	0.32 (±0.11)	13
Mainland	14	0.93	20	1.00	0.63 (±0.07)	15
Sample total	80	**0.68**	76	**0.96**	**0.56 (±0.03)**	15
NW Scotland						
Handa	4	0.50	3	1.33	1.20 (±0.10)	17
Rum	-	-	9	0.44	0.62 (±0.06)	15
Eigg	1	0.00	2	0.50	0.76 (±0.15)	18
Coll	-	-	10	0.60	0.65 (±0.28)	3

Elsewhere in Shetland, in the study area monitored annually by the Shetland Ringing Group, 2004 was considered to be the poorest breeding season since monitoring began in 1980 (Okill 2004a). During spring, territory attendance was low and consequently some pairs did not attempt to breed; those that did started later than usual, an early indication that there could be problems with the food supply. Only 32 pairs were successful (defined as those with chicks in July), the lowest number on record (1980-2003 mean 51.0, s.d. ±8.79) and the mean brood size at fledging (1.24) was the lowest for 15 years (1979-2003 mean, 1.35, s.e. ±0.02). Casual observations suggested that no sandeels were delivered to chicks after the third week of July and, unusually, mortality of older chicks was noted at a number of sites. Available evidence suggested that starvation occurred; no signs of predation, low weight of chicks for their age and plumage indicating birds were close to fledging. Two pairs again nested on artificial sites situated at reservoirs where falling water levels previously caused nesting divers to fail but only one pair successfully fledged (two) chicks.

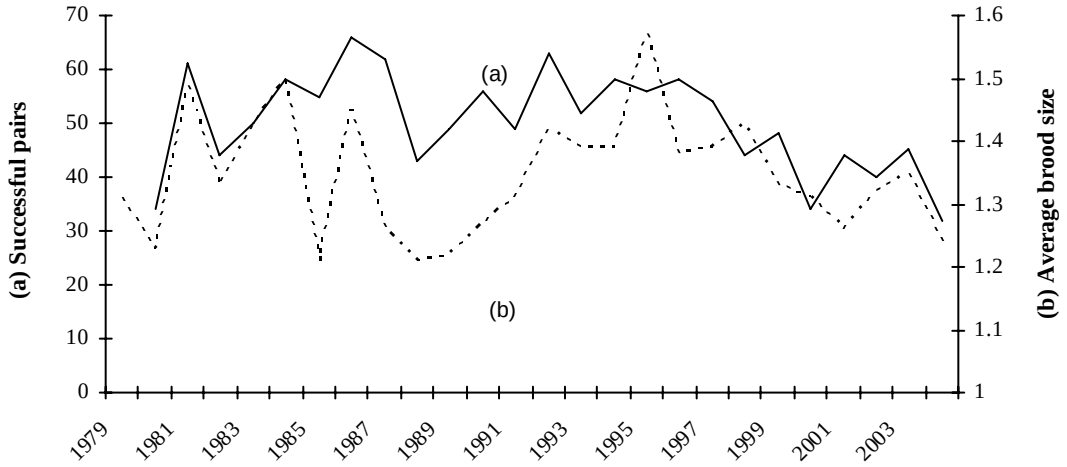

Figure 3.1.1 Annual variation in (a) numbers of 'successful' pairs (with chicks in mid-July) and (b) average brood-size near fledging at red-throated diver study areas in Shetland (parts of Unst, Eshaness, North Roe and Bressay), 1979-2004. Data are from Okill (2004a).

In sharp contrast, divers in **Orkney** were highly successful, where overall breeding success was above the long-term mean. On the mainland, divers were over 50% more successful than usual (Meek 2004). On Hoy, 136 previously known nesting sites were checked, 56 of which were occupied, eight fewer than in 2003 (Williams and Williams 2004). However, the number of successful nests increased from 32 to 38 over this period. Most failures occurred at the egg-stage (10 nests) with five nests failing at the chick stage and three failing at an unknown stage. Compared with those nesting in Shetland - where the phenomenon is more common - divers in Orkney only occasionally rear broods of two (Okill 2003a). However, in 2004, 15 broods of two-chicks were recorded on Hoy (where usually five or fewer of these are raised) from which all chicks fledged in addition to 23 from single-chick broods. It seems that adult divers on Orkney managed to find sufficient food to sustain chicks, unlike in Shetland, with resultant higher levels of success. Furthermore, divers in Orkney appear to have benefited from reduced predation of eggs and chicks by great skuas that experienced a poor breeding season due to a shortage of food. On Hoy for example, no great skua chicks were raised and many skuas deserted territories early on in the season.

In **north-west Scotland**, divers on Handa were highly successful compared with 2003 and productivity was above the long-term mean. Elsewhere, on Rum, Coll and Eigg, productivity was below average. However, on Eigg one pair successfully fledged a chick, the first to do so since 1999; but the other nest on the island was depredated by otters *Lutra lutra* (J. Chester, pers. comm.).

3.2 Northern fulmar *Fulmarus glacialis*

Between 2003 and 2004, the number of apparently occupied sites (AOS) in sample colonies decreased in regions bordering the North Sea and in NW Scotland, with moderate to large declines noted in Shetland, NE Scotland and NE England. In contrast, numbers in regions adjacent to the Irish Sea increased, although increases were generally small, except in NE Ireland. The population indices for most regions have declined since the mid to late 1990s. Overall productivity for the UK in 2004 was below average for 1986-2003, with most of regions less productive than in 2003, excluding NE England and those to the west of Britain.

Breeding numbers (Tables 3.2.1 and 3.2.2, Figure 3.2.1)

In **Shetland**, the regional population index decreased for the fourth successive year, reaching the lowest level since 1986. Counts of sample plots indicated significant decreases at Sumburgh Head ($t=4.836$, d.f.=8, $p<0.001$), Troswick Ness ($t=8.063$, d.f.=8, $p<0.001$) and Eshaness ($t=3.652$, d.f.=8, $p<0.01$) and a non-significant decline at Burravoe. Counts were more variable than in previous years and it was suspected that a significant number of birds classed as AOS were not actually incubating (Heubeck 2004). Decreases were also evident in the number of AOS in plots used to monitor breeding success on Hermaness and Fair Isle; the decrease at the latter site was particularly large with the number present the lowest recorded since 1986 (Shaw *et al.* 2004). In **Orkney**, whole colony counts at Marwick Head and Noup Cliffs had decreased by 21% (to 330 AOS) and by 52% (to 516 AOS) respectively since 1999. These declines are of a similar magnitude to those noted at some **Shetland** colonies during the late 1990s (Mavor *et al.* 2001).

Table 3.2.1 Regional population changes at monitored northern fulmar colonies, 2003-2004 (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 <0.01, *** P <0.001. Further details of calculation of trends are given in section 1.2.2.

Region	2003	2004	2003-2004 % change	% annual change
SW Scotland [a]	1,590	1,643	+3.3	-1.4 n.s. 1993-2003
NW Scotland [b]	739	698	-5.5	-1.2 n.s. 1986-2003
Shetland [c]	2,482	1,989	-19.9	+1.1** 1986-2003
NE Scotland [d]	223	125	-44.0	-
SE Scotland [e]	1,880	1,602	-14.8	+0.7 n.s. 1986-2003
NE England [f]	572	408	-28.7	+1.0 n.s. 1986-2003
Wales [g]	1,076	1,160	+7.8	+1.8*** 1986-2003
NE Ireland [h]	69	112	+62.3	-

Colonies: [a] 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, Skokholm, Bardsey, South Stack.

In **north-west Scotland**, the decline evident since 1996 continued, although the change between 2003 and 2004 was slight. On Handa, a non-significant decrease was recorded in sample plots between 2003 and 2004, however, a whole colony count revealed a decrease of 40%, to 2,119 AOS, since 2000. Little change was noted in the total population on Canna since 2003.

Sample populations along the east coasts of Scotland and England all showed moderate declines since 2003. A decrease of 44% was noted at the Sands of Forvie NNR (**north-east Scotland**) where the

population is now one-third of the peak count recorded in 2000. Elsewhere, triennial monitoring of sample plots at the Buchan Ness to Collieston and Gamrie to Pennan SPAs and at Fowlsheugh revealed decreases of 20%, 15% and 14% respectively since 2001, although only at the first named colony was the change significant ($t=3.997$, $d.f.=8$, $p<0.01$). In **south-east Scotland**, numbers at most colonies decreased, with the largest proportional declines noted at the Bass Rock and St Abb's Head. In **north-east England**, moderate to large decreases occurred on the Farne Islands, Coquet Island and at Boulby Cliffs, although no change was apparent at Huntcliff. The population indices in each of these regions have shown a downward trend since the mid 1990s.

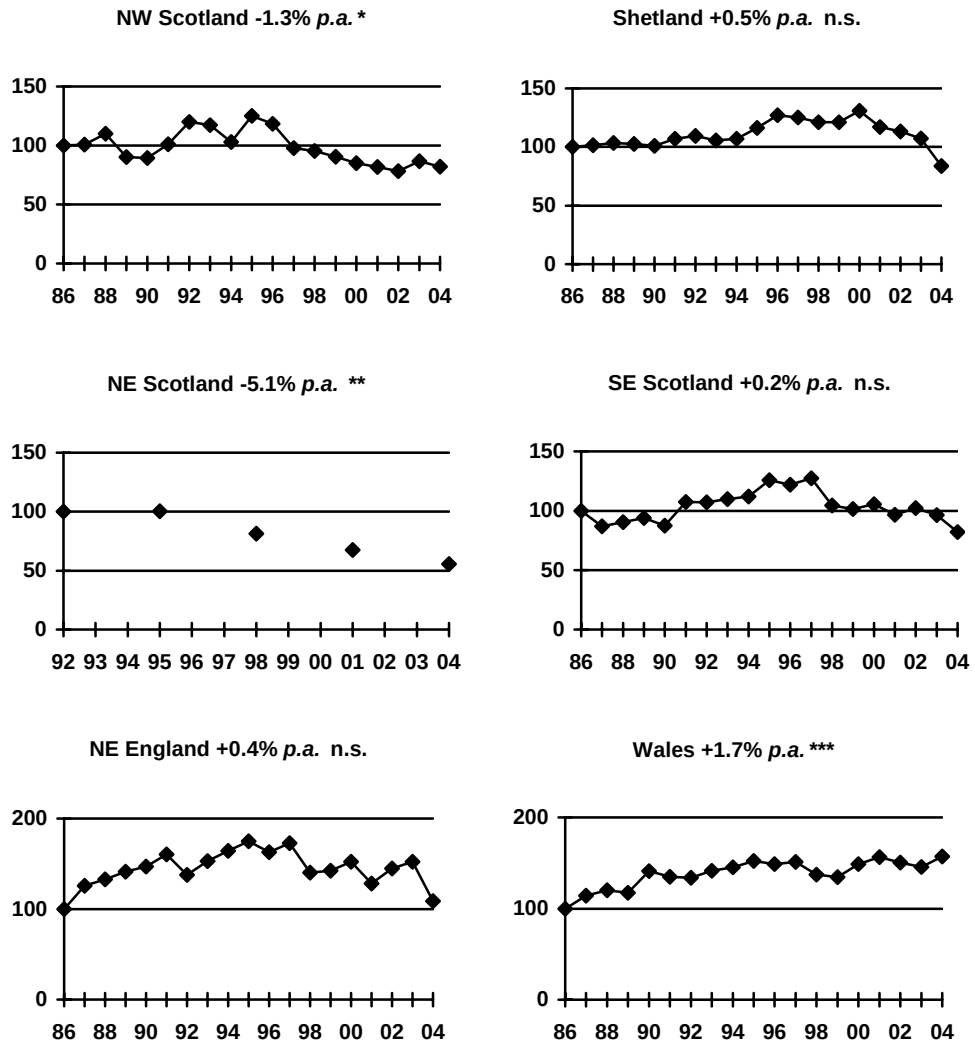

Figure 3.2.1 Regional population indices for breeding northern fulmars, 1986-2004 (apparently occupied sites in June). Average annual rates of change were calculated by regression of natural log of index against year (see section 1.2.2. for details). Unless otherwise indicated, three or more colonies were counted in each year. Statistical significance of trends indicated as: n.s. not significant, * $P<0.05$, ** $P<0.01$, *** $P<0.001$.

Along the west coast of Britain, and in Ireland, populations increased in most regions sampled between 2003 and 2004. In **south-west Scotland**, the overall increase was slight, with changes at Lunga and Colonsay in the order of 5% and no apparent change at Sanda.

Table 3.2.2 Population changes of northern fulmar 2003-2004 and 1986-2003 at selected sites referred to in the text. P\W indicates plot or whole-colony counts.

Region/Site		2003	2004	2003-2004 % change	1986-2003 Mean (±s.d.)	1986-2003 No. of years
SW Scotland						
Colonsay	W	567	596	+4.8	599 (66)	12
Lunga	W	523	547	+4.6	535 (86)	11
Sanda	W	500	500	0.0	397 (94)	15
NW Scotland						
Handa	P	102	91	-10.8	117 (16)	17
Canna	W	434	436	+0.5	508 (93)	18
Shetland						
Troswick Ness	P	999	815	-18.4	995 (126)	18
Sumburgh Head	P	241	194	-19.5	239 (28)	14
Burravoe	P	168	157	-6.5	167 (26)	17
Eshaness	P	350	308	-12.0	368 (23)	8
Hermaness	P	215	119	-7.4	296 (35)	15
Fair Isle	P	337	160	-52.5	366 (43)	11
NE Scotland						
Sands of Forvie	W	223	125	-44.0	274 (54)	15
SE Scotland						
Isle of May	W	248	236	-4.8	288 (67)	16
St Abb's Head	W	262	153	-41.6	315 (51)	18
Inchkeith	W	321	306	-4.7	455 (77)	17
Inchgarvie	W	205	206	+0.5	173 (53)	14
Fidra	W	194	204	+5.2	204 (59)	18
Inchmickery	W	35	24	-31.4	25 (12)	15
Inchcolm	W	206	205	-0.5	190 (43)	13
Craigleith	W	168	136	-19.0	163 (29)	16
Tantallon	P	113	85	-24.8	110 (12)	5
Bass Rock	W	119	40	-66.4	91 (47)	10
NE England						
Farnes	W	242	156	-35.5	239 (26)	18
Coquet	W	70	32	-54.3	56 (14)	17
Huntcliff	W	110	110	0.0	118 (43)	14
Boulby Cliff	W	150	110	-26.7	116 (21)	14
Wales						
Skomer	W	634	730	+15.1	654 (66)	18
Elegug Stacks	W	19	14	-26.3	30 (8)	11
Skokholm	W	146	150	+2.7	129 (32)	16
	P	18	10	-41.1	18 (-)	1
St Margaret's Head	W	18	13	-27.8	9 (6)	11
Stackpole Head	W	50	36	-28.0	46 (5)	6
	P	28	26	-7.1	28 (3)	8
Bardsey	W	41	45	+9.8	37 (8)	16
South Stack	W	24	44	+83.3	31 (14)	12
Caldey	W	106	98	-7.6	92 (22)	17
NW England/Isle of Man						
St Bee's Head	W	26	40	+53.8	63 (24)	16
NE Ireland						
Isle of Muck	W	32	74	+131.2	36 (14)	3
Copeland Islands	W	37	38	+2.7	28 (6)	5

In **Wales**, population indices have shown an upward trend since 1986. In 2004, whole colony counts at several colonies increased compared to 2003, particularly so at South Stack. Decreases were recorded at Caldey and Stackpole Head with a non-significant decrease also recorded in sample plots at the latter site. Elsewhere in the region, on Skokholm, numbers of AOS in the monitoring plots decreased significantly by 41% ($t=13.135$, d.f.=14, $p<0.001$) but the whole colony count showed little

change. In **north-west** and **south-west England**, overall numbers from sample colonies totalled less than 100 AOS; but had increased since 2003 by 15% and 11% respectively. Among these small colonies, an increase of 54% occurred at St Bee's Head. In **north-east Ireland**, a large increase was noted on the Isle of Muck but the similar sized population on the Copeland Islands remained stable. Numbers increased on Lambay (**south-east Ireland**) by 15% to 727 AOS since the last count in 1999.

Breeding success (Tables 3.2.3 and 3.2.4)

Mean productivity of northern fulmar across 31 sites in Britain and Ireland in 2004 was 0.30 (s.e. ±0.04) chicks per AOS, below the 1986-2003 mean of 0.42 (s.e. ±0.01) recorded from between 13 to 41 colonies annually. There was no significant difference between 26 colonies monitored in both 2003 and 2004. Colonies on the east coast of Britain were less successful than those along Irish Sea coasts.

In **Shetland**, mean productivity from seven colonies was 0.29 chicks per AOS, lower than in 2003 but not significantly so. Productivity at all colonies was lower than average except at Burravoe, where monitoring was initiated in 2003, and on Fair Isle. At Eshaness and Troswick Ness breeding success was lower than in any year since 1986. At the latter site, impressions that many birds classed as AOS earlier in the season were not in fact on eggs were confirmed - in one plot the mean June count was 107 AOS but not one chick was recorded. Less than 10% of chicks in monitoring plots had begun to lose their down by early August, suggesting either later laying than in recent years, slower chick growth, or both (Heubeck 2004). Ringing trips to other colonies in early August also recorded low numbers of chicks, many of which were in poor condition and estimated to be up to three weeks away from fledging (Okill 2004b).

Table 3.2.3 Northern fulmar breeding success grouped regionally, 2003-2004: 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. Statistical significance of between year change (t-test) indicated as: * P < 0.05.

Region	2003 chicks fledged/site				2004 chicks fledged/site				2003-2004 change	
	AOS[n]	Range	Mean	±s.e.	AOS[n]	Range	Mean	±s.e.	Mean[n]	±s.e.
SW Scotland [a]	14[1]	-	0.71	-	7[1]	-	0.86	-	+0.15[1]	-
NW Scotland [b]	438[3]	0.31-0.48	0.41	±0.05	182[2]	0.35-0.54	0.44	±0.10	-0.02[2]	±0.08
Shetland [c]	2,746[8]	0.25-0.56	0.37	±0.04	2,166[7]	0.16-0.43	0.29	±0.04	-0.06[7]	±0.04
Orkney [d]	707[5]	0.18-0.79	0.48	±0.12	794[8]	0.06-0.51	0.19	±0.06	-0.28[5]	±0.07 *
N Scotland [e]	90[2]	0.02-0.05	0.04	±0.02	90[2]	0.02-0.04	0.03	±0.01	-0.01[2]	±0.02
SE Scotland [f]	222[2]	0.05-0.44	0.24	±0.20	182[2]	0.00-0.21	0.10	±0.10	-0.14[2]	±0.09
NE England [g]	240[2]	0.31-0.49	0.40	±0.09	164[2]	0.38-0.45	0.42	±0.04	+0.02[2]	±0.05
Wales [h]	264[2]	0.49-0.50	0.50	±0.01	282[2]	0.49-0.55	0.52	±0.03	+0.02[2]	±0.02
Isle of Man [I]	93[3]	0.08-0.16	0.11	±0.02	99[4]	0.00-0.53	0.30	±0.11	+0.28[3]	±0.06 *
NE Ireland [j]	-	-	-	-	30[1]	-	0.63	-	-	-
Total	4,814[28]	0.02-0.79	**0.36**	±0.04	3,996[31]	0.00-0.55	**0.30**	±0.04	**-0.04[26]**	±0.04

Colonies: [a] Ailsa Craig; [b] Handa, St Kilda (2003 only), Canna; [c] Hermaness, Burravoe, Eshaness, Noss, Westerwick (2003 only), Troswick Ness, Sumburgh Head, Fair Isle; [d] Costa Head, Mull Head, Gultak, Rousay, Papa Westray, Hoy (2004 only), North Ronaldsay (2004 only), Eynhallow (2004 only); [e] Easter Ross, Wilkhaven; [f] Isle of May, Tantallon; [g] Farne Islands, Coquet; [h] Skomer, Skokholm; [i] Glen Maye , Bradda, Glen Mooar-Gob y Deigan, Cass Strooan-Peel Headlands (2004 only); [j] Big Copeland Island (2004 only).

Colonies in **Orkney** were similarly unproductive. Overall success was 0.19 chicks per AOS from eight colonies, at all of which productivity was lower than normal, with success at its lowest ever

recorded on Papa Westray, Costa Head, Mull Head and Gultak. A significant reduction in breeding success was evident in the five colonies monitored in both 2003 and 2004.

Table 3.2.4. Breeding success (chicks fledged per AOS) of northern fulmar 2003-2004 and 1986-2003 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	2003	2004	1986-2003	
			Mean (±s.e.)	No. of years
SW Scotland				
Ailsa Craig	0.71 (14)	0.86 (71)	0.71 (0.03)	12
NW Scotland				
Canna	0.48 (81)	0.54 (91)	0.39 (0.02)	18
Handa	0.45 (102)	0.35 (91)	0.48 (0.03)	15
Shetland				
Hermaness	0.34 (403)	0.29 (354)	0.42 (0.03)	15
Noss	0.28 (191)	0.31 (167)	0.41 (0.03)	11
Eshaness	0.44 (350)	0.16 (308)	0.44 (0.02)	18
Burravoe	0.30 (168)	0.32 (157)	0.30 (-)	1
Troswick Ness	0.26 (999)	0.17 (815)	0.42 (0.02)	18
Sumburgh Head	0.42 (239)	0.32 (194)	0.46 (0.03)	18
Fair Isle	0.37 (337)	0.43 (171)	0.44 (0.02)	18
Orkney				
North Ronaldsay	-	0.08 (49)	0.25 (0.06)	7
Papa Westray	0.79 (86)	0.26 (58)	0.54 (0.06)	8
Rousay	0.71 (111)	0.51 (57)	0.53 (0.04)	12
Costa Head	0.38 (178)	0.10 (164)	0.50 (0.02)	15
Mull Head	0.34 (190)	0.06 (167)	0.42 (0.01)	15
Gultak	0.18 (142)	0.08 (139)	0.42 (0.03)	15
Hoy	-	0.40 (90)	0.48 (0.03)	9
Eynhallow		0.06 (70)		
N Scotland				
Easter Ross	0.02 (47)	0.04 (46)	0.18 (0.04)	10
Wilkhaven	0.05 (43)	0.02 (44)	0.28 (0.08)	7
SE Scotland				
Isle of May	0.44 (109)	0.21 (97)	0.42 (0.02)	18
Tantallon	0.05 (113)	0.00 (85)	0.34 (0.05)	17
NE England				
Farne Islands	0.49 (170)	0.45 (132)	0.55 (0.03)	18
Coquet Island	0.31 (70)	0.38 (32)	0.48 (0.06)	7
NW England/Isle of Man				
Glen Maye	0.16 (28)	0.53 (28)	0.35 (0.04)	17
Bradda	0.10 (29)	0.41 (29)	0.32 (0.05)	12
Glen Mooar – Gob y Deigan	0.08 (36)	0.25 (31)	0.24 (0.07)	5
Peel Headlands	-	0.00 (10)	0.50 (0.05)	3
Wales				
Skomer	0.49 (118)	0.49 (132)	0.54 (0.04)	12
Skokholm	0.50 (146)	0.55 (150)	0.48 (0.02)	10
Bardsey *	0.90 (41)	0.87 (45)	0.78 (0.09)	8
NE Ireland				
Big Copeland Island	-	0.63 (30)	-	-

Breeding success of northern fulmars was far lower in **north Scotland** compared with other regions; those at Easter Ross and Wilkhaven fledged very few chicks, for the second successive year. Productivity was also low in **south-east Scotland**, with levels of success on the Isle of May and at Tantallon, where complete failure occurred, the lowest on record.

In all other regions, breeding success in 2004 was generally close to or higher than the UK mean, suggesting that the factors that reduced productivity were perhaps restricted to the northern part of the North Sea. Overall breeding success in **north-east England** was similar to 2003, although birds were less successful on the Farne Islands but more successful on Coquet Island. Colonies in **north-west Scotland** were moderately successful, although a small non-significant decline was recorded from colonies surveyed in both 2003 and 2004. Success at the two monitored colonies differed; on Canna productivity was the second highest recorded at the site while on Handa it was the second lowest. At Ailsa Craig (**south-west Scotland)**, a productivity value of 0.71 chicks per AOS was obtained from a small sample of nest sites, which was greater than the long-term mean for this comparatively successful colony. Colonies in **north-west England/Isle of Man** were relatively productive compared with 2003, although success of 0.30 chicks per AOS is still lower than the long-term UK mean. Breeding success here was very variable between colonies, ranging from total failure (at Peel Headlands) to 0.53 chicks fledged per AOS (at Glen Maye); however, a significant increase in breeding success was detected from the three colonies monitored in both years. Overall breeding success in **Wales** was similar to 2003 with productivity at individual colonies close to, or above, the long-term averages. Northern fulmars also had a successful breeding season on Big Copeland Island (**north-east Ireland**).

3.3 Manx shearwater *Puffinus puffinus*

Breeding numbers and breeding success (Table 3.3.1)

As in previous years, relatively little information was available for this species. In **north-west Scotland**, breeding success on Rum was the lowest recorded since 1999. For first time since the Highland Ring Group set up their monitoring plot (*c*.100 burrows) on Rum in 1994, rat-depredated (*Rattus norvegicus*) eggs were found - five in total - though it is not known if they were already abandoned (Ramsay 2004). Rat activity elsewhere within the shearwater colony during the 2004 breeding season was confirmed using chew-sticks (Werndly 2004). Previous trapping surveys carried out on Rum in the mid-1980s found very low densities of rats in the shearwater colonies and only four depredated eggs were found despite intensive studies within the colony in 1984 and 1985, and these were already abandoned eggs (Thompson 1987). Further work is clearly required to determine if rat activity within the shearwater colonies on Rum has in fact increased over the last 20 years and if their presence is having a detrimental impact on the shearwaters. On Canna, where rat predation led to the extirpation of shearwaters in 2002, taped calls were played at the entrances of 50 burrrows in 2004 but failed to elicit any responses and no other signs of shearwater presence (e.g. depredated adults) were found on the island (Swann 2004a). On Sanda (**south-west Scotland**), productivity was again high.

Table 3.3.1 Breeding success of Manx shearwaters (chicks fledged per AOB or egg), 2003-2004 and 1986-2003. Figures in parentheses indicate the number of occupied burrows from which success was derived.

Region/site	2003	2004	1986-2003 mean	
			Mean (±s.e.)	No. of years
NW Scotland				
Rum	0.75 (93)	0.62 (106)	0.69 (0.04)	11
SW Scotland				
Sanda	1.00 (40)	0.97 (65)	0.84 (0.08)	3
Wales				
Skomer	0.70 (104)	0.53 (97)	0.56 (0.04)	13
Bardsey	0.88 (100)	0.80 (100)	0.81 (0.01)	8

In **Wales**, breeding success on Bardsey, although lower than in 2003, was close to the long-term mean. As in previous years a pair of carrion crows *Corvus corone* depredated eggs, removing as many as 40 from accessible nest chambers (Stansfield 2004). On Skomer, 965 responses were elicited from 3,204 burrows in 18 sample plots, the highest number recorded since monitoring began in 1998 and the third

successive annual increase in responses at these plots (although the upward trend is not statistically significant; Perrins 2004). Breeding success was low, but close to the long-term mean. The estimated adult survival rate, at 76% for 2002 (the most recent year for which an estimate is available), was again low compared with the long-term mean (1977-2001, 85%, s.d. ±9.5). However, there is no discernable trend over this period (Perrins 2004). A minimum of 10 chicks were found on Lundy (**south-west England**) in September 2004 - the first confirmed record of successful breeding on the island in 50 years, although few systematic searches for chicks have been undertaken in the past.

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 playback of the male's "purr" song (Gilbert *et al*. 1998a and b; Ratcliffe *et al*. 1998). This method, first advocated by James and Robertson (1985), has recently been applied during Seabird 2000 to provide the first accurate population estimates for Britain and Ireland (Mitchell *et al.* 2004). Other methods are also used to monitor populations on an annual basis. The count unit is the apparently occupied site.

During a visit to Mousa, **Shetland**, in September 34 chicks were ringed (cf. 50 in 2003, 47 in 2002, 35 in 2001, 49 in 2000 and 38 in 1999). Three adults were with very small chicks and a further two were still incubating. Eleven nests had failed and at least four sites were inaccessible. The oldest of the chicks was still about 2.5 weeks from fledging, indicating another late breeding season (Okill 2004).

Following the 37% decline between 2002 and 2003, a playback survey of two 1,600m² sample plots on Shillay, **north-west Scotland**, elicited a total of 52 responses, six more than in 2003. On Priest Island, a tape-playback survey estimated a total island breeding population of 2,668 AOS (95% CLs 1,446 – 7,0975), that represents a substantial if not significant decline from 4,370 AOS (95% CLs 3,338 – 6,069) in 1999. The poor precision of the 2004 estimate resulted from a much sparser distribution of responses than in 1999 and it is difficult to know whether or not there has been a genuine decline in the breeding population on Priest Island between 1999 and 2004, or whether poor breeding conditions in 2004 led to low levels of burrow attendance (Insley *et al.* 2004). Estimates of the number of birds attending the Priest Island colony at night (including breeders, non-breeders and immatures) obtained from mark-recapture analysis of nocturnal mist-netting studies conducted annually during 2001-04 varied between 8,000 and 12,000 but showed no overall trend (Insley *et al.* 2004). Similar mark-recapture analysis of birds attending the colony on Eilean Hoan produced an estimate of 267 birds, compared to 775 in 2003, 391 in 2002, 464 in 2001 (Insley *et al.* 2004). Preliminary results of a tape play-back survey of Village Bay on Hirta, St Kilda, suggested a marked decline in AOS compared with a similar survey undertaken in 1999 (JNCC, unpublished data).

On Bardsey Island, **Wales**, a diurnal tape-playback survey in June located 79 AOS, 43 more than in 2003, although 26 responses were from a previously un-surveyed area. In August, 11 chicks were ringed, the largest number ever ringed in a single year on the island (Stansfield 2004). On Skomer Island, tape play-back yielded an estimated 248 AOS, a third more than was estimated in 2003, with new sub-colonies continuing to be found (Brown and Morgan 2004).

3.5 Leach's storm-petrel *Oceanodroma leucorhoa*

No data on breeding numbers or breeding success was supplied in 2004.

3.6 Northern gannet *Morus bassanus*

Breeding numbers (Figure 3.6.1)

Most of the gannetries in Britain and Ireland were censused in 2003 and 2004, in a project coordinated by Sarah Wanless, Stuart Murray and Mike Harris at CEH, Banchory and funded by Scottish Natural Heritage, Countryside Council for Wales and National Parks and Wildlife Service (Republic of Ireland) (Wanless *et al*. 2004, 2005, in press). Gannetries in the Channel Islands are to be censused in 2005. These follow surveys in 1984-88 and 1994-95, which detailed changes in the gannet population nationally and at individual colonies. Preliminary results are presented below, together with changes that have occurred since the previous survey, although some of the smaller colonies have been surveyed during the intervening years (see below and previous reports in this series). For details of the 2004 survey and a full analysis of trends see Wanless *et al.* (2005b).

Table 3.6.1 Counts of northern gannets in 1994-95 (Mitchell *et al.* 2004) and 2003-2004 (Wanless *et al.* 2004, 2005a, 2005b). Units are apparently occupied sites (S) or nests (N).

	1994-95 counts			2003-04 counts			% change since
	Count	Units	Year	Count	Units	Year	previous survey
Hermaness	11,994	N	1994	15,633	N	2003	+30.3
Noss	7,310	S	1994	8,652	N	2003	+18.4
Foula	600	S	1994	919	S	2004	+53.2
Fair Isle	965	N	1995	1,875	N	2004	+94.3
Westray	0	-	-	14	N	2004	-
Sule Skerry	0	-	-	57	S	2004	-
Sule Stack	4,888	S	1994	4,618	S	2004	-5.5
Sula Sgeir	10,440	S	1994	9,225	S	2004	-11.6
Flannan Isles	1,438	S	1994	2,760	S	2004	+91.9
St Kilda	60,428	S	1994	59,622	S	2004	-1.3
Troup Head	545	N	1995	1,547	N	2004	+183.8
Bass Rock	34,397	N	1995	48,065	S	2004	+39.7
Ailsa Craig	32,456	S	1995	27,130	S	2004	-16.4
Scar Rocks	1,952	S	1995	2,394	S	2004	+22.6
Bempton	1,631	N	1994	3,940	N	2004	+141.6
Grassholm	27,500	S	1994	32,094	S	2004	+16.7
St Margaret's Island	0	-	-	1	N	2004	-
Total Britain	**196,544**			**218,546**			**+11.2**
Clare Island	3	N	1995	3	N	2004	0.0
Little Skellig	26,436	S	1994	29,683	S	2004	+12.3
Bull Rock	1,815	S	1994	3,694	S	2004	+103.5
Great Saltee	1,250	S	1994	2,446	N	2004	+95.7
Ireland's Eye	45	N	1994	285	N	2004	+533.3
Total Ireland	**29,549**			**36,111**			**+22.2**
Ortac	2,098	S	1994	-	-	-	-
Les Etacs	3,380	S	1994	-	-	-	-
Total Channel Islands	**5,478**			**-**			**-**

Overall, the gannet population of Britain and Ireland is still increasing, having risen by 11% and 22% respectively since 1994-95. Most colonies are still increasing in size (particularly Bass Rock), the largest proportional increases generally occurred at smaller colonies, but notable apparent decreases occurred at Sula Sgeir and Ailsa Craig. However, since 1995, two new colonies have been

established, at Westray and Sule Skerry (both **Orkney**), with another on St Margaret's Island (**Wales**) in the early stages of establishment.

On Fair Isle (**Shetland**), one of the more regularly monitored colonies, the northern gannet population has increased rapidly in recent years (average increase 17% per annum since 2000). However, between 2003 and 2004, the rate of increase slowed markedly, with similar numbers recorded in both years (1,866 and 1875 AON, respectively), although this may be a temporary feature as numbers have reached a transient plateau previously, notably between 1996 and 2000. Furthermore, the newest and fastest growing sub-section, on Sheep Rock, increased by 77% from 13 AON in 2003 to 23 in 2004, so with ample room for expansion it would seem that the colony will continue to increase in size (Shaw *et al.* 2004).

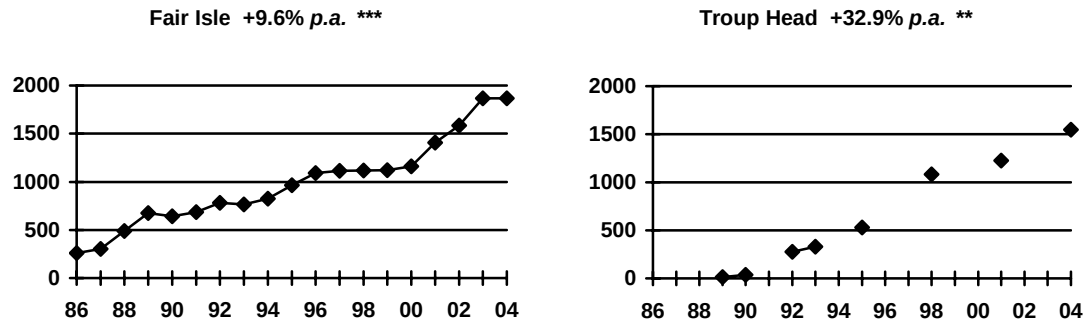

Figure 3.6.1 Northern gannet population trends for Fair Isle and Troup Head, 1986-2004 (apparently occupied nests in June). Average annual rates of change were calculated by regression of natural log of index against year (see section 1.2.2. for details). Statistical significance of trend indicated as: *** P<0.001.

Regular triennial monitoring is carried out at Troup Head (**north-east Scotland**). A total of 1,547 AON was recorded there in 2004, an increase of 26% since 2001. Assuming a constant annual rate of change, the rate of increase between 2001 and 2004 (8%) appears to have doubled compared with that recorded between 1998 and 2001. Since the establishment of the colony in 1988 high annual rates of increase have been recorded, e.g. +178% between 1989 and 1992, +25.2 between 1992 and 1995 and +26% between 1995 and 1998 (triennial monitoring data only). These figures show that the trend of increasing numbers at this site continues, but that the rate of increase has slowed.

Breeding success (Table 3.6.1)

In **Shetland,** breeding success was equal to the long-term average on Fair Isle and Noss but below average at Hermaness; in all three colonies success was marginally lower than in 2003. The northern gannet's ability to travel hundreds of miles when foraging, coupled with a diet less reliant on sandeels, ensured that productivity remained high compared with other Shetland seabirds. On Hermaness, based on regurgitates seen in the colony during ringing trips, it appeared that birds fed mainly on mackerel *Scomber scombrus* – no sandeels were seen in any samples (Wilson 2004). On Fair Isle, a small sample of regurgitates also consisted mostly of mackerel (3 samples) with another containing a number of large lesser sandeels (Shaw *et al.* 2004).

On Ailsa Craig (**south-west Scotland**), where it was noted as being a late season with some chicks estimated not to have fledged until early November, productivity was far lower than in 2003 but again close to the long-term mean for the colony (B. Zonfrillo, pers. comm.).

Table 3.6.1 Northern gannet breeding success 2003 and 2004, and 1986-2003: estimated number of chicks fledged per occupied nest. In 2003 and 2004, with the exception of Fair Isle and Troup Head, productivity is shown as the mean and standard error of figures from sample plots (superscript n = number of plots). The 2003 and 2004 figures for Fair Isle are for all nests totalled across sample plots.

Colony	2003 fledged/nest		2004 fledged/nest		1986-2003 fledged /nest	
	AON[n]	Mean (±s.e.)	AON[n]	Mean (±s.e.)	Mean (±s.e.)	Years
SW Scotland						
Ailsa Craig	276[2]	0.86 (±0.01)	247[2]	0.72 (±0.04)	0.70 (±0.02)	13
Shetland						
Hermaness	741[3]	0.63 (±0.01)	702[3]	0.61 (±0.02)	0.66 (±0.01)	15
Noss	442[4]	0.73 (±0.02)	460[4]	0.69 (±0.04)	0.70 (±0.01)	18
Fair Isle	226[1]	0.69 (-)	231[1]	0.68 (-)	0.68 (±0.02)	18
NE Scotland						
Troup Head	-	-	1,547[1]	0.65 (-)	0.60 (±0.04)	7
All colonies	1,685	**0.73 (±0.05)**	3,187	**0.67 (±0.02)**	**0.69 (±0.01)**	18

At Troup Head (**north-east Scotland**), breeding success in 2004 was estimated as 0.65 chicks fledged per nest. This is above average for the colony, which has traditionally produced fewer chicks per nest than other UK colonies.

3.7 Great cormorant *Phalacrocorax carbo*

Numbers increased, or at least remained stable, in most regions in 2004 although moderate declines were recorded in NW Scotland and Inland England. The greatest proportional increases were in SE England, NW England/Isle of Man and in NE Ireland. Total productivity across all colonies suggested that great cormorants had a relatively successful breeding season, when compared with other seabird species.

Breeding numbers (Tables 3.7.1 and 3.7.2, Figure 3.7.1)

Between 2003 and 2004, the largest proportional increase occurred in **north-east Ireland**, where numbers are monitored at just one colony, Strangford Lough and increased by 36% to 442 AON, the highest count recorded at the colony, which is now over three times the size it was in 1986. Moderate increases were noted in the sample coastal populations of **south-east England** and **north-west England/Isle of Man.** In the former region, numbers have increased since the mid 1990s, although monitoring has been too sporadic to enable calculation of meaningful annual rates of change. In 2004, counts at both Dungeness and Rye Harbour were the highest on record. In the latter region, where an upward trend is evident since 1986, numbers continued to increase. Counts at South Solway and St Bee's Head were the highest on record, while at Gob ny Skeddan and Grune Point numbers were relatively high for each site.

Table 3.7.1 Regional population changes at monitored great cormorant colonies, 2003-2004 (apparently occupied nests in May-June). Regional samples of fewer than 50 AON or of only one colony are excluded. Trends for 1986-2003 are average annual rates of change shown by sample populations. Significance of trends indicated as: n.s. not significant, * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$). Further details of calculation of trends are given in section 1.2.2.

Region	2003	2004	2003-2004 % change	% annual change
SW Scotland [a]	302	288	-4.6	+0.2 n.s. 1986-2003
NW Scotland [b]	78	60	-23.1	-
Shetland [c]	206	222	+7.8	-3.0** 1986-2003
N Scotland [d]	289	279	-3.5	-3.2** 1986-2003
SE Scotland [e]	353	363	+2.8	-0.5 n.s. 1986-2003
NE England [f]	239	256	+7.1	-1.2* 1986-2003
Inland England [g]	176	154	-12.5	+11.6%*** 1986-2003
SE England [h]	206	239	+16.0	-
SW England [i]	146	147	+0.7	-2.2** 1986-2003
Wales [j]	763	767	+0.5	+0.5 n.s. 1986-2003
NW England/Isle of Man [k]	221	253	+14.5	+4.5*** 1986-2003
NE Ireland [l]	325	442	+36.0	+6.8*** 1986-2003

Colonies: [a] Sanda, Port o' Warren, Ruadh Sgeir, Corr Eilean, Carraig an Daimh, Eilean Dubh, Eilean Buidhe (Portavedie), Sgat Mor; [b] An Glas Eilean, Loch an Tomain; [c] Clett Stacks, Heads of Grocken, High Holm; [d] Stacks of Occumster, Ceann Leathad, Traigh Bhuidhe, Neuk Mhor, Ord Point, Cnoc na Stri, North Sutor; [e] Carr Craig, The Lamb, Inchkeith, Inchmickery; [f] Farne Islands, Huntcliff, Boulby Cliff; [g] Rutland Water, Aldermaston; [h] Dungeness, Rye Harbour; [i] Ballard Cliff, White Nothe, Gad Cliff; [j] South Stack, Skomer, St Margaret's Island, Ynys Gwylan Fawr, Ynys Traws, Craig yr Aderyn, Great Orme, Little Orme; [k] South Solway, St Bee's Head, Grune Point, Gob ny Skeddan, Peel Hill, Contray Head to Traie Cronkan; [l] Strangford Lough.

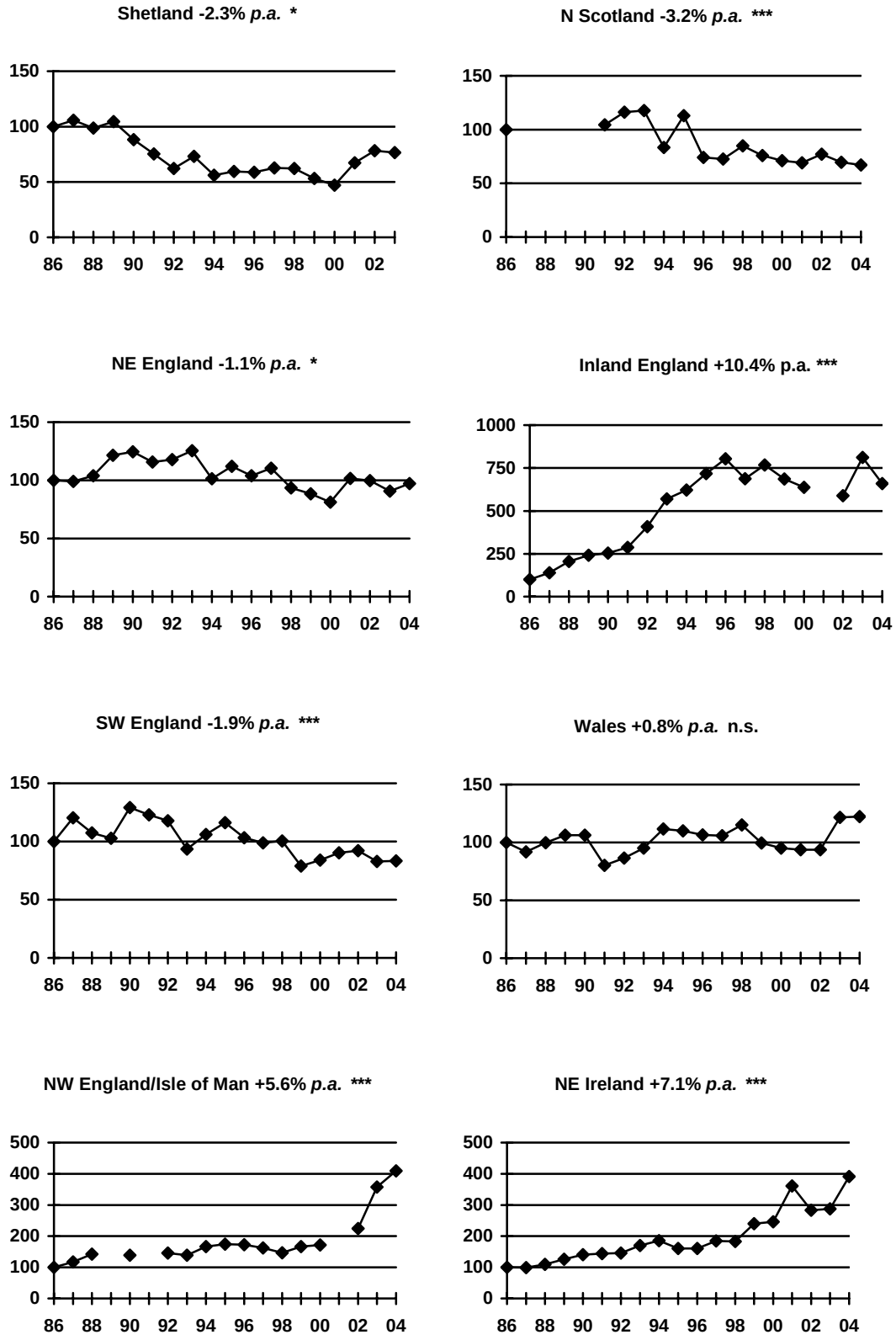

Figure 3.7.1 Regional population indices for breeding great cormorant, 1986-2004 (apparently occupied nests in late May or June). Average annual rates of change were calculated by regression of natural log of index against year (see section 1.2.2. for details). Significance of trends indicated as: n.s. not significant, * P < 0.05, *** P < 0.001.

Table 3.7.2 Population changes of great cormorant 2003 and 2004 and 1986-2003 at selected sites referred to in the text.

Region/Site	2003	2004	2003-2004 % change	1986-2003	
				Mean (±s.d.)	No. of years
SW Scotland					
Port o' Warren	137	153	+11.7	152 (40)	12
Sanda	20	17	-15.0	24 (6)	16
Ruadh Sgeir	17	15	-11.8	18 (7)	4
Corr Eilean	30	30	0.0	38 (9)	10
Eilean Buidhe	64	58	-9.4	46 (24)	10
Eilean Dubh	16	15	-6.2	7 (5)	7
Sgat Mor	18	0	-100.0	18 (-)	1
NW Scotland					
An Glas Eilean	37	26	-27.0	37 (4)	10
Loch an Tomain	41	34	-17.1	47 (7)	4
Shetland					
High Holm	50	66	+32.0	44 (7)	15
Clett Stacks	149	145	-2.7	127 (27)	17
N Scotland					
Stacks of Occumster	11	22	+100.0	18 (12)	12
Ceann Leathad	26	25	-3.8	37 (14)	14
Ord of Caithness	34	20	-41.2	75 (31)	12
Cnoc na Stri	25	34	+36.0	25 (-)	1
North Sutor	193	178	-7.8	221 (35)	13
NE Scotland					
Sands of Forvie	23	36	+56.5	13 (8)	3
SE Scotland					
Inchkeith	124	137	+10.5	103 (21)	3
Carr Craig	87	82	-5.8	111 (60)	17
The Lamb	95	96	+1.0	120 (43)	17
Fast Castle	47	48	+2.1	42 (10)	11
NE England					
Farne Islands	179	187	+4.5	222 (43)	18
Saltburn	27	26	-3.7	41 (10)	17
Boulby	33	43	+30.3	23 (12)	10
Inland England					
Rutland Water	144	128	-11.1	53 (44)	9
Aldermaston	32	26	-18.8	20 (12)	6
SE England					
Dungeness	81	107	+32.1	81 (15)	4
Rye Harbour	125	132	+5.6	70 (51)	4
SW England					
Gad Cliff	45	43	-4.4	75 (26)	16
White Nothe	34	23	-32.4	30 (8)	4
Ballard Cliff	67	81	+20.9	106 (31)	14
Wales					
St Margaret's Island	166	189	+13.9	208 (51)	18
Ynys Gwylan Fawr	51	45	-11.8	47 (22)	15
Craig yr Aderyn	63	68	+7.9	72 (14)	11
Great Orme's Head	21	25	+19.0	45 (19)	13
Little Orme's Head	452	403	-10.8	273 (86)	9
NW England/Isle of Man					
South Solway	39	63	+61.5	23 (23)	2
St Bee's Head	75	86	+14.7	22 (23)	10
Grune Point	67	64	-4.5	56 (10)	9
Gob ny Skeddan	37	37	0.0	19 (14)	6
NE Ireland					
Strangford Lough	325	442	+36.0	216 (77)	18

Numbers in **north-east Scotland** continue to rise after recent colonisation. The colony at the Sands of Forvie has increased annually since its foundation in 2001. Triennial monitoring in the Buchan Ness to Collieston SPA recorded 69 AON in 2004 (*cf.* three AON in 1995 and 50 in 2001).

Few other regional populations showed notable changes between 2003 and 2004. Sample populations in **south-west Scotland** appeared to be stable. Although numbers at the majority of colonies decreased, many are small so reductions at six were offset by an increase in the largest colony at Port o' Warren; 153 AON was the largest count there since 1996. The colony at Sgat Mor, where nesting was recorded for the first time in 2003, was deserted. A large decrease was evident in **north-west Scotland,** where few colonies are monitored annually; numbers fell at both colonies visited.

In **Shetland**, although numbers increased slightly between 2003 and 2004, not all regularly monitored colonies were visited. At High Holm, numbers are now at their highest during the history of the SMP, while the small population at Grocken continued to grow since its desertion during 1997-98. The population index for the archipelago shows a downward trend between 1989 and 2000 but a steady increase has been detected since. However, four former colonies remain deserted.

At the Ord of Caithness and North Sutor (**north Scotland**), numbers in 2004 were among the lowest recorded for each site. Although moderate to large proportional increases were noted at Stacks of Occumster and Cnoc na Stri, the latter site colonised as recently as 2003, three other colonies in this region have been deserted and the regional index shows a highly significant negative trend since 1986. In **south-east Scotland**, there was virtually no change in the sample population between 2003 and 2004, but the number at Inchkeith, the largest colony, reached a new peak. The sample populations of **north-east England** increased slightly between 2003 and 2004 although the trend has been one of general decline since the early 1990s. Changes at individual colonies were small, except at Boulby.

Regional populations of **Wales** and **south-west England** appeared to be stable between 2003 and 2004, but changes at individual colonies varied considerably. The long-term trends show little change in the former region but in the latter a highly significant decline has been detected. Increases were recorded at St Margaret's Island, Great Ormes Head and Ballard Cliff with a moderate decrease at White Nothe. At Little Ormes Head a decrease of 10% was recorded, but numbers at this colony have fluctuated greatly in recent years. A moderate proportional decline occurred in **inland England,** although few colonies were monitored in 2004; numbers at Rutland Water and Aldermaston decreased.

Breeding success (Table 3.7.3)

Mean productivity in 2004 was 2.15 chicks per AON (s.e. $\pm$0.29) from eight colonies. When compared with the long-term mean of 1.95 (s.e. $\pm$0.08) chicks per AON, recorded from between three and 15 colonies annually, this suggests a successful breeding season, although the mean productivity in 2004 still falls within the range of values typically recorded for the species (Mitchell *et al.* 2004).

At North Sutor (**north Scotland**), productivity of 1.89 chicks fledged per AON was below the colony average and was the lowest value recorded at this successful site since 1999 (Swann 2004b). Many seabirds at this site had low breeding success in 2004, attributable to a shortage of sandeels (Swann 2004b), which are not an important component in the diet of great cormorants.

At Ballard Cliff (**south-west England**), breeding success was above the colony mean, although monitoring has only recently been instigated there. On the Isle of Man (**north-west England/Isle of Man**), breeding success at Will's Strand was below average, although in the national context it was higher than that from most other colonies. Productivity in the recently established small colony at Peel Headlands was also high. Elsewhere in the region, colonies on mainland England had mixed success, with an above average breeding season at Grune Point, compared with less than average productivity at South Solway which was the least successful colony in the UK in 2004.

Table 3.7.3 Breeding success (chicks fledged per occupied nest) of great cormorant 2003 and 2004 and 1986-2003 at selected sites referred to in the text. Figures in parentheses under 2003 and 2004 are the number of nests from which success estimate was derived.

Region/site	2003	2004	1986-2003	
			Mean (±s.e.)	No. of years
N Scotland				
North Sutor	1.94 (143)	1.89 (118)	2.08 (±0.13)	12
SW England				
Ballard Cliff	1.34 (35)	1.67 (57)	1.27 (±0.06)	3
Wales				
Ynysoedd Gwylan	3.92 (51)	3.66 (63)	2.98 (±0.40)	4
Skomer	1.13 (8)	1.50 (6)	1.70 (±0.44)	4
NW England/Isle of Man				
Grune Point	1.16 (69)	1.88 (64)	1.48 (±0.32)	2
South Solway 'B'	1.15 (39)	1.19 (63)	1.58 (±0.42)	2
Will's Strand	2.61 (31)	2.40 (35)	2.51 (±0.05)	5
Peel Hill	-	3.00 (3)	-	-

In **Wales**, productivity on Skomer was low, when compared with the colony average, although it was the most successful season there in recent years. The first documented breeding record for Bardsey was a pair in 2004 that raised three young, and the nearby Ynysoedd Gwylan again held the most successful colony in the UK.

3.8 European shag *Phalacrocorax aristotelis*

Between 2003 and 2004, sample populations in most regions declined, although there was no apparent geographical pattern to these changes. Moderate declines were recorded in north-west Scotland, north-east England and Wales. A large increase was noted in north Scotland; triennial monitoring in north-east Scotland also revealed increasing numbers. However, when interpreting breeding numbers it should be noted that variable proportions of adult shags nest in a given year, and that changes in numbers nesting does not necessarily equate to a change in the number present or alive. In 2004, it was thought that non-breeding by adults, in response to low food availability, was responsible for some of the reductions in the number of AON counted. The mean breeding success across all sites was below the long-term UK mean.

Breeding numbers (Tables 3.8.1 and 3.8.2, Figure 3.8.1)

The increase that occurred in **south-east Scotland** between 2002 and 2003 was not repeated between 2003 and 2004 (NB the increase stated in Mavor *et al.* 2003 should read +27.8%, not +60.1%). Numbers appeared to be stable; a 29% decrease at the region's largest colony, on the Isle of May, was countered by increases at most other colonies in the region; counts at Inchkeith, Inchmickery and Fidra were the highest on record. However, the colonies on Craigleith and the Bass Rock are still one-third to one-half of their former size. Observations from the Isle of May suggested it was a late breeding season with many birds choosing not to nest. Return rates of colour ringed birds appeared to be near normal, suggesting that the decline was not due to adult mortality. Subsequently, many birds struggled to find food, especially sandeels, despite the continued closure of the commercial fishery on the nearby Wee Bankie (Harris *et al.* 2004). Eighty-five km to the south of the Isle May, on the Farne Islands (**north-east England**), numbers also fell (by 16%) compared with 2003 (Walton *et al.* 2004). Here too, sandeels were scarce when adults were provisioning chicks. However, despite these declines, the trend in both regions since 1994 is still upward, with significant annual rates of increase.

Table 3.8.1 Regional population changes at monitored European shag colonies, 2003-2004 (apparently occupied nests in May-June). Counts with a reported inaccuracy of > ±5%, and regional samples < 100 AON, are excluded. Trends for 1986-2003 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	2003	2004	2003-2004 % change	% annual change
SW Scotland [a]	1,361	1,477	+8.5	+2.6 n.s. 1994-2003
NW Scotland [b]	693	579	-16.5	-4.7*** 1987-2003
Shetland [c]	499	486	-2.6	-3.3*** 1986-2003
N Scotland [d]	359	447	+24.5	-
SE Scotland [e]	2,159	2,059	-4.6	+9.2 * 1994-2003
NE England [f]	1,678	1,410	-16.0	+6.7** 1994-2003
Wales [g]	167	143	-14.4	-

Colonies: [a] Mull of Galloway, Colonsay (sample plots), Sanda Island, Lunga, Carraig an Daimh, Eilean Buidhe, Glas Eilean, Ruadh Sgeir, Eilean na Cille; [b] 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, Stackpole Head, Elegug Stacks and nearby, St Margaret's Island, Bardsey, Ynysoedd Gwylan.

In **Shetland**, numbers in those colonies monitored in 2003 and 2004 were relatively stable. A large proportional increase was noted on Noss but numbers at Sumburgh Head and Noness declined for the third and fourth year, respectively. Non-breeding and late laying in 2004 may have exaggerated the level of these changes (Heubeck 2004). On Foula, the largest colony in the north-east Atlantic, numbers appeared normal in April but dwindled throughout the season so that by July few remained. The number of shags (all ages) estimated around the island at this time, whether on land or close inshore, totalled just 468 birds (S. Gear, pers. comm.) in a colony which would normally hold in excess of 2,000 breeding pairs (Mitchell *et al.* 2004) plus an associated contingent of non-breeders and immatures.

Moderate decreases also occurred in two regions on the west coast of Britain between 2003 and 2004. In **north-west Scotland**, numbers declined by 17%, with decreases noted at both Canna and Eigg. The regional population has shown a downward trend since 1987, with an annual rate of decrease of 4.7% per annum, the largest to be recorded in any UK region. Data from **Wales** also indicated a moderate decline between 2003 and 2004, with a large decrease on Bardsey. Elsewhere in the region, numbers on Middleholm increased from 29 in 2001 to 49 AON in 2004. In **south-west England,** the total number at monitored colonies had changed little since 2003 (down to 65 AON from 67), with no change detected at the largest colony between St Aldhelm's Head and Durlston Head.

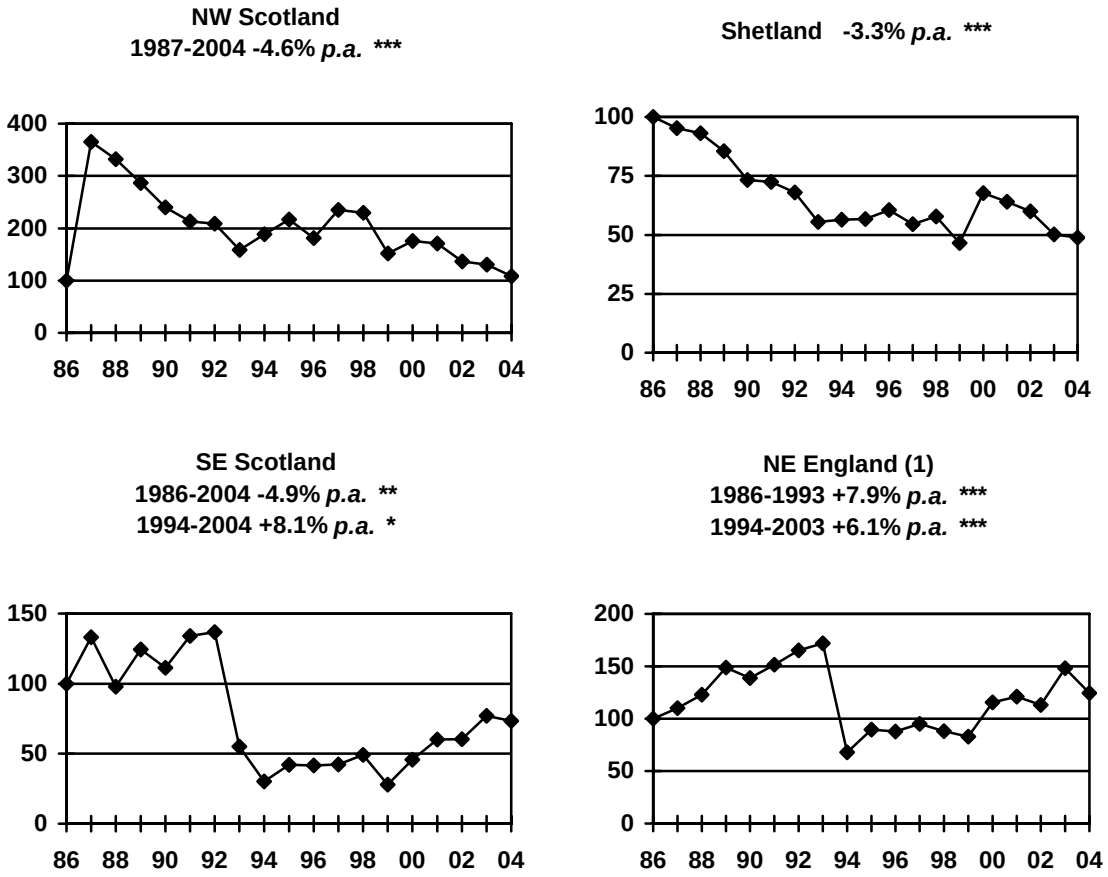

Figure 3.8.1 Population indices for breeding European shags, 1986-2004 (apparently occupied nests in late May or June). Average annual rates of change were calculated by regression of natural log of index against year (see section 1.2.2. for details). Trends are shown for the periods indicated. Three 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.

Increases were detected in **south-west Scotland** and **north Scotland** between 2003 and 2004. In the former region, numbers quadrupled at Mull of Galloway, doubled at Eilean na Cill with a 67% increase noted at Carraig an Daimh, all small colonies. Proportionally smaller increases occurred at the larger colonies, on Lunga and Sanda. Decreases in the order of 10% were seen at Ruadh Sgeir and in sample plots at Colonsay. A larger annual change was recorded in north Scotland, where at North Sutor numbers rose by 25% to a new high of 447 AON. That this region should show such an increase when numbers in regions to the north and south decreased (albeit due to non-breeding of adults in response to low food availability) is tentative evidence that feeding conditions for this species in the Moray Firth were not as poor as elsewhere. This is supported by higher productivity of shags in this region compared with other regions bordering the North Sea (see below). Also on the east coast, in the Buchan Ness to Collieston and Gamrie to Pennan SPAs (**north-east Scotland**), numbers also had increased by 43% (to 594 AON) and 41% (to 301 AON) respectively, since they were last monitored in 2001.

Table 3.8.2 Population changes of European shag 2003-2004 and 1986-2003 at selected colonies mentioned in the text. All counts refer to whole colony unless stated.

Region/Site	2003	2004	2003-2004 % change	1986-2003 Mean (±s.d.)	1986-2003 No. of years
SW Scotland					
Lunga	325	342	+5.2	220 (82)	11
Mull of Galloway	25	102	+308.0	46 (14)	15
Eilean Buidhe	42	45	+7.1	33 (6)	10
Ruadh Sgeir	90	79	-12.2	92 (20)	10
Sanda	792	800	+1.0	589 (106)	11
Carraig an Daimh	15	25	+66.7	26 (16)	10
Colonsay (sample plots)	43	39	-9.3	40 (6)	11
Eilean na Cille	22	44	+100.0	19 (6)	10
NW Scotland					
Canna	603	495	-17.9	943 (297)	18
Eigg	63	57	-9.5	68 (16)	17
Shetland					
Sumburgh Head	216	183	-15.3	268 (109)	17
Noss	47	74	+57.4	76 (17)	18
Noness	117	107	-8.6	116 (18)	15
Fair Isle (sample plots)	119	122	+2.5	176 (42)	18
Orkney					
Auskerry	25	40	+60.0	26 (3)	3
N Scotland					
North Sutor	359	447	+24.5	278 (63)	9
NE Scotland					
Portknockie	43	47	+9.3	14 (15)	13
SE Scotland					
Isle of May	968	687	-29.0	953 (515)	18
Inchkeith	139	153	+10.1	36 (37)	17
Inchmickery	70	78	+11.4	31 (15)	14
Fidra	254	272	+7.1	124 (66)	18
Craigleith	197	324	+64.5	320 (187)	17
The Lamb	124	111	-10.5	138 (103)	14
Bass Rock	24	46	+91.7	41 (32)	9
St Abb's Head	365	369	+1.1	287 (105)	18
NE England					
Farne Islands	1,678	1,410	-16.0	1,333 (346)	18
Wales					
Bardsey	52	36	-34.6	30 (17)	18
Ynysoedd Gwylan	89	84	-5.6	101 (31)	7
SW England					
St Aldhelm's – Durlston Head	52	52	0.0	53 (8)	7

Breeding success (Tables 3.8.3 and 3.8.4)

For 12 colonies where detailed monitoring was undertaken in 2004, the mean breeding success was 1.04 (s.e. $\pm$0.26) chicks per AON, below the long-term mean of 1.31 (s.e. $\pm$0.04) recorded from between three and 20 colonies sampled during 1986-2003. A comparison of 11 colonies sampled in both 2003 and 2004 revealed a non-significant decrease in breeding success of 0.38 (s.e. $\pm$0.19).

In 2004, regions on the west coast were generally more successful than those on the east coast. In **Wales**, overall productivity of 2.55 chicks fledged per AON from two colonies studied - Bardsey and nearby Ynysoedd Gwylan - was similar to that attained in 2003 and both recorded values above their long-term means. Elsewhere along the west coast, overall success was relatively high in **south-west** and **north-west Scotland**. Birds on Sanda, Eilean Aoghainn and Rum all raised more than one chick

per nest. Shags were less successful on Canna, but although productivity there was below the long-term mean it was still much higher than in 2003. However, there was much variation in productivity between sub-colonies on the island, with those nesting in boulder fields having low success (0.01) compared with those nesting on cliff ledges (1.39); egg remains suggested that rats were responsible for the low success in the boulder fields (Swann 2004a).

Table 3.8.3 European shag breeding success, grouped regionally 2003-2004: 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; * P<0.05.

Regions	**2003 chicks fledged/nest**				**2004 chicks fledged/nest**				**2003-2004 change**	
	Nests[n]	**Range**	**Mean**	**±s.e.**	**Nests[n]**	**Range**	**Mean**	**±s.e.**	**Mean[n]**	**±s.e.**
SW Scotland [a]	266[6]	0.46-2.19	1.56	±0.27	102[2]	1.32-1.49	1.40	±0.08	-0.18[1]	-
NW Scotland [b]	66[2]	0.21-1.41	0.81	±0.40	215[2]	0.73-1.80	1.26	±0.54	+0.52[1]	-
Shetland [c]	264[3]	0.14-1.33	0.83	±0.36	196[3]	0.00-0.75	0.45	±0.23	-0.38[3]	±0.14
N Scotland [d]	87[1]	-	1.09	-	98[1]	-	0.93	-	-0.16[1]	-
SE Scotland [e]	255[2]	1.76-1.83	1.80	±0.04	203[2]	0.28-0.30	0.29	±0.01	-1.51[2]	±0.04*
NE England [f]	330[1]	-	0.42	-	270[1]	-	0.26	-	-0.16[1]	-
Wales [g]	141[2]	2.30-2.79	2.54	±0.24	120[2]	2.19-2.92	2.55	±0.36	+0.01[2]	±0.12
Total	1,409[17]	0.14-2.79	**1.40**	±0.19	1,204[13]	0.00-2.92	**1.07**	±0.24	**-0.38[11]**	±0.19
Detailed only	1,248[13]	0.14-2.79	**1.34**	±0.22	1,186[12]	0.00-2.92	**1.04**	±0.26	**-0.38[11]**	±0.19

Colonies: [a] Ruadh Sgeir (2003 only), Eilean Aoghainn (2004 only), Eilean Buidhe (2003 only), Carraig an Daimh (2003 only), Eilean na Cille (2003 only), Eileanan Glasa (2003 only), Sanda; [b] Canna, An Glas Eilean (2003 only), Rum (2004 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.

On the east coast, the most successful region was **north Scotland** (albeit represented by just one colony – North Sutor), but success there was still lower than in 2003 and the lowest recorded since 1997. In **Shetland**, overall productivity across three monitored colonies was lower than at the same colonies in 2003, falling by 0.38 chicks per AON, although the decline was not statistically significant. At Sumburgh Head, laying was considerably later than in recent years and the subsequent success rate 0.75 chicks fledged per AON was the lowest since 1990, attributable mainly to predation of eggs and chicks by ravens *Corvus corax* and great skuas (Heubeck 2004). Success was at its lowest ever on Fair Isle, where many young birds died late in the season (Shaw *et al.* 2004). On Foula, following the exodus of adults that occurred (see above), the number of nests in study plots was severely depressed; only eight AON were found (*cf.* 43 in 2003), all of which failed (S. Gear, *pers. comm.*).

The regions with the lowest productivity in 2004 were **south-east Scotland** and **north-east England**. A significant reduction in breeding success was detected in the former region, where productivity on the Isle of May was at its lowest level since 1993, and at St Abb's Head success was the lowest on record. As with many sites in the UK, breeding in 2004 on the Isle of May was much later than in 2003, with the first egg laid on 17 April (compared with 23 March in 2003). Many 2-3 week-old chicks died in torrential rain in late June, but it was also evident that adults had difficulty finding food, so success would probably have probably been low despite the weather. Regurgitates from chicks indicated that sandeels accounted for 49% by biomass; in only one previous year (1999) did sandeels constitute less than 50% of their diet. Furthermore, examination of regurgitated pellets, collected around active nests during the chick rearing period, found that 42% contained sandeel otoliths. The frequency of occurrence of sandeels in pellets at this time of year is typically double this (70-98%, n=10 years) suggesting that shags nesting on the Isle of May had difficulty in obtaining sandeels in 2004 (Harris *et al.* 2004).

In **north-east England**, breeding success on the Farne Islands was just 0.26 chicks fledged per AON, the lowest recorded there during the SMP. The reasons given for this low success were poor weather and low food availability during the chick stage, combined with predation of nest contents by large gulls early in the season, after which, few second clutches were laid (Walton 2004).

Table 3.8.4. Breeding success (chicks fledged per occupied nest) of European shag 2003 and 2004 and 1986-2003 at selected colonies mentioned in the text. Figures in parentheses under 2003 and 2004 are the number of nests from which success estimate was derived.

Region/site	2003	2004	1986-2003	
			Mean (±s.e.)	No. of years
SW Scotland				
Sanda	1.50 (78)	1.32 (84)	1.80 (0.25)	3
Eilean Aoghainn	-	1.49 (18)	1.40 (0.39)	3
NW Scotland				
Rum	-	1.80 (104)	1.02 (0.06)	2
Canna	0.21 (34)	0.73 (111)	1.16 (0.13)	18
Shetland				
Sumburgh Head	1.13 (160)	0.75 (135)	1.22 (0.07)	16
Fair Isle	1.33 (61)	0.69 (53)	1.45 (0.06)	18
Foula	0.14 (43)	0.00 (8)	0.89 (0.20)	7
N Scotland				
North Sutor	1.09 (87)	0.93 (98)	1.50 (0.10)	12
SE Scotland				
Isle of May	1.83 (157)	0.28 (103)	0.97 (0.11)	18
St Abb's Head	1.76 (98)	0.30 (100)	1.35 (0.12)	14
NE England				
Farne Islands	0.42 (330)	0.27 (271)	1.00 (0.10)	15
Wales				
Bardsey	2.79 (52)	2.92 (36)	2.10 (0.12)	10
Ynysoedd Gwylan	2.30 (89)	2.19 (84)	1.96 (0.09)	5

3.9 Arctic skua *Stercorarius parasiticus*

Total numbers of Arctic skuas breeding at monitored colonies declined for a twelfth consecutive year to around a third of those recorded in 1992, with the largest decrease of c.35% occurring between 2003 and 2004. The decline was most notable in Shetland, where numbers approximately halved from 2003, whilst those in Orkney decreased by 8%. A severe sandeel shortage caused an almost complete breeding failure in Shetland and very low productivity in large parts of Orkney. In contrast, productivity on Handa (NW Scotland) was high, at 1.32 chicks per AOT.

Breeding numbers (Tables 3.9.1 and 3.9.2)

The total number of apparently occupied territories (AOT) at colonies monitored in **Shetland** fell by around 50% from 2003, reaching their lowest level since the SMP began, in 1986. Of particular note was the sharp decrease in the numbers of AOT at the major colonies on Fair Isle and Foula. On Fair Isle, numbers declined by 40% from 2003 to the lowest figure since the colony was established in the 1950s (Shaw *et al*. 2004). Due to the transient behaviour of many of the birds and the lack of interest in breeding it was difficult to obtain a definate figure of numbers of territories held on Foula. A whole colony count on 10 May revealed only 38 birds, with only 13 pairs seen to lay compared with 48 pairs in 2003 (S. Gear, pers. comm.). Just three AOT remained on Noss, where the highest count was 22 AOT in 1986. No change occurred on Fetlar where numbers at the three study plots remained at the same low level as in the previous two years. The only colony that showed a small increase was Mousa, where two more AOT were recorded than in 2003. However, this is still less than half the long-term mean of 17 AOT for this site.

Table 3.9.1 Regional population changes at monitored Arctic skua colonies, 2003-2004 (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	2003	2004	2003-2004 % change
Shetland	151	≥73	-<51.7[6]
Orkney	73	67	-8.2[4]
NW Scotland	36	30	-16.7[1]
Britain	260	170	-34.6[11]

After a brief period of recovery in 2002 and 2003, numbers at North Hill (Papa Westray), **Orkney**, declined in 2004 to just half the long-term mean of 117 AOT. Anecdotal evidence suggests similar declines at other sites in the archipelago (Meek 2004). On Eday, only about 10% of the usual number of Arctic skuas were present (M. Cockram, pers. comm.) and on Rousay, the key area on the western maritime heaths held very few pairs. The usual breeding area on Shapinsay held no Arctic skuas in 2004, whilst at a site on Flotta, out of a total of 21 birds present just two pairs attempted to breed.

In **north-west Scotland**, numbers declined for a third consecutive year on Handa to just under half the long-term mean for the site. At Coll, **south-west Scotland**, 12 AOT were recorded, two more than in 2003.

Table 3.9.2 Population (apparently occupied territories) changes of arctic skua 2003–2004 and 1986-2003 at selected sites referred to in the text.

Region/Site	2003	2004	2003-2004 % change	1986-2003 Mean (±s.d.)	1986-2003 No. of years
Shetland					
Hermaness	10	8	-20.0	12 (3)	12
Fetlar	9	9	0.0	18 (5)	14
Noss	7	3	-57.1	13 (5)	18
Mousa	5	7	+40.0	17 (6.0)	14
Fair Isle	55	33	-40.0	86 (18)	17
Foula	*c*.65	>13	-<80.0	119 (22)	15
Orkney					
North Hill	68	58	-14.7	117 (35)	15
NW Scotland					
Handa	36	30	-16.7	31 (6)	18

Breeding success (Tables 3.9.3 and 3.9.4)

The sandeel shortage that affected Arctic skuas on **Shetland** during the previous three breeding seasons recurred in 2004 and resulted in the least successful breeding season since the SMP began in 1986; complete breeding failure was reported from all monitored sites. The 2004 season was the first since records began in the 1950s in which Fair Isle's Arctic skuas experienced a total breeding failure (Shaw *et al.* 2004). There was no evidence of successful breeding at most of the areas visited by the Shetland Ringing Group, except for a single fledged chick at Eshaness (Okill 2004). The majority of pairs appeared to abstain from breeding or abandoned their nests during incubation (French and Smith 2004, Shaw *et al*. 2004, Bliss and Sykes 2004, H. Moncrieff, pers comm.). The lack of Arctic terns on Fetlar meant that the Arctic skuas there had no suitable hosts from which to steal fish and instead, sought alternative prey such as wader eggs and chicks (French and Smith 2004).

Table 3.9.3 Arctic skua breeding success grouped regionally, 2003–2004: estimated number of chicks fledged per apparently occupied territory (AOT) 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 apparently occupied territories 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). (- indicates no data were available).

Region	2003 chicks fledged/pair AOT^n	Range	Overall	2004 chicks fledged/pair AOT^n	Range	Overall
Shetland	151^6	0.00-0.20	0.03	≥73^6	0.00	0.00
Orkney	121^4	0.00-1.20	0.74	67^4	0.00-0.33	0.09

In contrast to 2002 and 2003, food was apparently scarce in **Orkney** in 2004; only four chicks were reared from 58 AOT at North Hill, Papa Westray. Few, if any, chicks were reared on Eday, Eynhallow, North Ronaldsay or Egilsay (Meek 2004). However, two young fledged from six AOT at Hoy.

In contrast to the poor season in the Northern Isles, Arctic skuas on Handa (**north-west Scotland**), were very productive, at 1.32 chicks per AOT. Only two young fledged from 12 AOT on Coll (**south-west Scotland**).

Table 3.9.4 Breeding success (chick fledged per apparently occupied territory) of Arctic skua 2003–2004 and 1986-2003 at selected sites referred to in the text.

Region/site	2003	2004	1986-2003	
			mean (±s.e.)	No. of years
Shetland				
Hermaness	0.20	0.00	0.57 (0.11)	13
Fetlar	0.00	0.00	0.44 (0.13)	17
Noss	0.00	0.00	0.44 (0.08)	18
Mousa	0.00	0.00	0.50 (0.13)	14
Fair Isle	0.09	0.00	0.59 (0.11)	16
Foula	0.00	0.00	0.57 (0.12)	13
Orkney				
North Hill	1.20	0.07	0.68 (0.10)	14

3.10 Great skua *Stercorarius skua*

Total numbers of apparently occupied territories (AOT) of great skaus declined in 2004, compared to 2003. The breeding season started late in Orkney and Shetland and the lack of available sandeels resulted in very low productivity, with high levels of conspecific depredation occurring at some sites. Breeding performance on Handa(NW Scotland) was markedly higher than in the Northern Isles.

Breeding numbers (Tables 3.10.1 and 3.10.2)

The total number of AOTs at monitored colonies in **Shetland** decreased by 14% between 2003 and 2004, although small increases occurred in study plots on Fetlar and Hermaness. Small decreases of around 5% were reported from Noss and Mousa. A large decline of 34% was recorded on Fair Isle from 145 in 2003 to 96 AOT in 2004. Elsewhere on Shetland, pairs were present on South Bressay and on Papa Stour, but no count data were available (Okill 2004). At Fitful Head 41 AOT were recorded and a further four on St Ninian's Isle (R. Furness, pers. comm.).

Table 3.10.1 Regional population changes at monitored great skua colonies, 2003–2004 (apparently occupied territories). Superscript = number of colonies counted in both years.

Region	2003	2004	2003-2004 % change
Shetland	318	274	-13.8^{5}
Orkney	121	79	-34.7^{4}
North-west Scotland	218	213	-2.3^{3}

Total breeding numbers at monitored colonies in **Orkney** declined by 35% between 2003 and 2004. This was mainly attributable to the particularly large decrease that occurred on Swona, where only 18 AOT were recorded, compared with 62 in 2003 and 85 in 2002. At the Stourdale study site on Hoy, numbers declined by 12% since 2003 to just below the long-term mean of 47 AOT. Elsewhere on Hoy, the general impression was of distinctly reduced numbers, although no count data were available (Meek 2004). No data were available from Birsay Moors.

There was little change on Handa, **north-west Scotland**, where 207 AOT were recorded, compared with 209 in 2003, and two AOT were reported from Canna (three in 2003) and four from Priest Island (six in 2003). A survey on Coll, **south-west Scotland,** counted a total of 11 AOT.

Table 3.10.2 Population (apparently occupied territories) changes of great skuas 2003–2004 and 1986-2003 at selected sites referred to in the text (- indicates no data available).

Region/Site	2003	2004	2003-2004 % change	1986-2003 Mean (±s.d.)	1986-2003 No. of years
Shetland					
Hermaness	35	38	+8.6	44 (16)	15
Fetlar	62	68	+9.7	60 (7)	9
Noss	55	52	-5.5	51 (12)	6
Mousa	21	20	-4.8	16 (5)	10
Fair Isle	145	96	-33.8	109 (29)	17
Orkney					
North Hill	14	15	+7.1	11 (2)	8
Stourdale	51	45	-11.8	47 (14)	18
Swona	62	18	-71.0	-	-
NW Scotland					
Handa	209	207	-1.0	123 (57)	16

Breeding success (Tables 3.10.3 and 3.10.4)

All but one of the monitored sites in **Shetland** reported their lowest productivity since the SMP began, in 1986. Breeding was late and many of the pairs occupying a territory abstained from breeding. A shortage of sandeels was apparent from the lack of sandeel remains found in great skua pellets (R. Furness, pers. comm.) and great skuas switched to other food sources. Those birds nesting successfully on St Ninian's Isle fed chicks largely on rabbits, whilst on Mousa the diet consisted mainly of storm-petrels (R. Furness, pers. comm.). On Fair Isle, conspecific depredation of eggs and chicks resulted in only one young fledged from 96 AOT (Shaw *et al.* 2004). Great skuas on Hermaness fared better than elsewhere in Shetland, although predation of chicks by conspecifics depressed productivity to its second lowest level since 1988 (Wilson 2004).

Table 3.10.3 Great skua breeding success, grouped regionally 2003–2004: estimated number of chicks fledged per apparently occupied territory 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). (- indicates no data were available).

Region	2003 chicks fledged/AOT			2004 chicks fledged/AOT		
	Pairs^n	Range	Overall	Pairs^n	Range	Overall
Shetland	417^5	0.05-0.69	0.27	399^5	0.01-0.34	0.08
Orkney	16^3	0.00-0.86	0.75	17^3	0.00-1.00	0.29

Great skuas in **Orkney** were slightly more productive than those in Shetland, although the North Hill colony on Papa Westray raised only 0.27 chicks per AOT: the lowest productivity since monitoring began in 1996. By the end of July, most of the 47 territories at Stourdale, Hoy, were deserted and only 5-10 young fledged from this site (C. Booth, pers. comm.). Diet on Hoy comprised mostly mountain hare *Lepus timidus*, but some sandeels were also found in pellets (R. Furness, pers. comm.).

One chick fledged from 11 AOT on Coll, **south-west Scotland**, and although two pairs were present on the Treshnish Isles (one fewer than in 2003), there was no evidence of breeding (Ward 2004). **North-west Scotland** was the only region where great skuas bred successfully in 2004. Productivity

on Handa was 0.87 chicks per AOT which was higher than that in in 2003 and Two pairs successfully reared three chicks on Canna.

Table 3.10.4 Breeding success (chicks fledged per apparently occupied territory) of great skuas 2003–2004 and 1986-2003 at selected sites referred to in the text.

Region/site	**2003**	**2004**	**1986-2003**	
			mean (±s.e.)	**No. of years**
Shetland				
Hermaness	0.69	0.34	0.85 (0.06)	16
Fetlar	0.40	0.15	0.83 (0.10)	9
Noss	0.67	0.10	0.54 (0.06)	16
Mousa	-	0.15	0.78 (0.07)	9
Fair Isle	0.05	0.01	0.73 (0.08)	15
Foula	0.10-0.20	0.01	0.61 (0.08)	15
Orkney				
North Hill	0.86	0.27	0.70 (0.09)	8

3.11 Mediterranean gull *Larus melanocephalus*

Breeding numbers and breeding success

Mediterranean gull was an extreme rarity in Britain as recently as the 1930s but numbers seen along our shores have increased substantially in recent decades. Colonies around the Black Sea increased in size, 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), and with this increase has come 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 would appear to have increased somewhat from the 110 pairs (plus three pairs in the Republic of Ireland) given for the period 1999-2002 (Mitchell *et al.* 2004), because 140 AON were recorded in south-east England alone in 2004. However, it is difficult to interpret apparent year-to-year changes in breeding numbers of this still scarce species. This is in part due to the habit of birds moving between sites and in part due to the possibility that colonies have been missed or under- reported.

In **south-east England**, the species' stronghold in Britain and Ireland, a new high was reached in 2004, of more than 140 AON. The number breeding at the largest single colony increased from 33 AON in 2003 to 57 AON – the most ever recorded there. Elsewhere in the region, new maximum counts were recorded at two colonies in the Thames Estuary that held a combined total of at least 53 AON. Breeding success at these colonies appeared to be moderate to low, although precise estimates were difficult to obtain in the field, due to the great distance between nesting birds and the nearest observation point. Seven AON within three colonies were found in **east England** in 2004, compared with two AON at two sites in 2003. Few sites in Ireland or northern England were monitored in 2004.

3.12 Black-headed gull *Larus ridibundus*

Numbers of black-headed gulls at sample colonies increased in most regions between 2003 and 2004, with those in SW and NE Scotland, and SE, SW and NW England being particularly substantial. Only in Orkney was a decrease recorded. However, changes in numbers at sample colonies are not necessarily representative of broader regional trends because black-headed gulls readily move their breeding sites between years, more so than most other gull species. Low productivity was evident at many sites due to predation and inclement weather; birds fledged an average of 0.58 chicks per pair in 2004.

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

In **Orkney**, numbers at sampled colonies declined by 14% since 2003. At the largest colony, on Shapinsay, numbers fell by 17%, although breeding success at this site improved considerably from 2003. In contrast, productivity on Egilsay was low: 154 pairs fledged only seven young. Elsewhere in the region, numbers nesting at the Loch of Banks/The Loons appeared to be stable. Few data were available from **Shetland,** but those sites monitored suggested another poor year. The regularly monitored colony on Fetlar, which as recently as 1999 held 102 pairs, was deserted in 2004 after complete breeding failures in 2000-2003 (French and Smith 2004). On Mainland, 10 pairs nested at Tingwall Loch and fledged a few chicks, whereas between 2000 and 2003 all colonies in the Tingwall Valley suffered complete failure.

A moderate increase in numbers was recorded in **south-west Scotland**. In the Mink-Seabird Project study area (between Mallaig and Tarbert on the Kintyre peninsula), large proportional increases (> 50%) were noted on Eilean Inshaig and Eilean an Ruisg. Overall breeding success was high in 2004: 179 pairs fledged 1.12 chicks per pair compared with 0.42 chicks from 133 pairs in 2003 and 0.71 chicks fledged from 162 pairs in 2002. Of five sites where breeding success was known, mink *Mustela vison* were thought to be active at one, where six pairs failed completely. All four sites that successfully fledged chicks benefited from mink control (Craik 2004). Outwith this study area, large proportional changes were noted at Mersehead and on The Reef, Tiree.

Table 3.12.1 Regional population changes at monitored black-headed gull colonies, 2003-2004. Figures are breeding pairs, apparently incubating adults or apparently occupied nests in May-June. Regional samples of less than 100 pairs are excluded.

Region	2003	2004	2003-2004 % change
SW Scotland [a]	199	242	+21.6
Orkney [b]	686	591	-13.8
NE Scotland [c]	489	860	+75.9
NE England [d]	2,750	2,977	+8.3
E England [e]	*c.*5,173	*c.*5,596	+8.2
SE England [f]	5,650	6,750	+19.5
SW England [g]	107	165	+54.2
NW England [h]	1,929	2,516	+30.4
NE Ireland [i]	3,309	3,727	+12.6

Colonies: [a] Mersehead, Loch Gruinart, Lochwinnoch, Tiree Reef, Eilean Inshaig, Eilean an Ruisg, Airds Islet, Black Rock (Crinan); [b] Shapinsay, The Loons, Loch of Banks, Brodgar; [c] Loch of Strathbeg, Sands of Forvie; [d] Farne Islands, Coquet Island, Fairburn Ings, Blacktoft Sands; [e] Blakeney Point, Scolt Head, Snettisham, Minsmere, Havergate; [f] Rye Harbour, Dungeness, Chichester, Langstone Harbour, Hayling Oysterbeds, North Solent; [g] Brownsea Island; [h] Hodbarrow, Rockliffe, Dee Estuary, Leighton Moss; [i] Strangford Lough, Big Copeland Island.

The large increase noted in **north-east Scotland** was mainly due to numbers at the Sands of Forvie NNR more than doubling between 2003 and 2004. However, despite this increase, numbers are only about half of those recorded in 2002, following a 74% decline between 2002 and 2003. No details were available on breeding success. At the Loch of Strathbeg, numbers fell by 65% since 2003.

A slight increase was noted in **north-east England** between 2003 and 2004, where the number on Coquet was the highest since 1994, and on the Farne Islands was the highest on record. A decrease of 16% was noted at Fairburn Ings. Productivity from two sample plots on Coquet was 1.05 chicks fledged per nest, less than in 2003 and below the site mean (Lowe *et al.* 2004). A similar proportional increase was noted in **east England** over the same period. An estimate of the largest colony, at Scolt Head, indicated that numbers had declined by 450 pairs (-17%), with a decrease also detected at Minsmere. Large proportional increases were noted at Snettisham and Havergate. The number at Blakeney Point appeared to be stable but the colony at nearby Stiffkey Marshes - which was estimated to hold 2,500 pairs in 2002 - was deserted. Breeding success at Blakeney and Scolt Head was moderate, with low productivity at Foulness Point but near complete failure at Hamford Water, where an estimated 5,000 AON fledged only five young. At the last site, most birds had three attempts at nesting but failed each time due to high tides while, at Blakeney Point, the low success was attributed to bad weather and poor feeding conditions (C. Smith, pers. comm.).

Table 3.12.2 Population change of black-headed gull 2003-2004 and 1986-2003 at selected colonies mentioned in the text. Figures are breeding pairs, apparently incubating adults or apparently occupied nests in May-June.

Region/Site	2003	2004	2003-2004	1986-2003	
			% change	Mean (±s.d.)	No. of years
SW Scotland					
Eilean Inshaig	67	101	+50.1	121 (100)	14
Eilean an Ruisg	30	62	+106.7	9 (12)	5
Mersehead	59	10	-83.0	59	1
The Reef, Tiree	16	42	162.5	16	1
Shetland					
Fetlar	3	0	-100.0	29 (31)	8
Orkney					
Shapinsay	516	425	-17.3	512 (48)	3
Loch of Banks/The Loons	168	158	-5.9	168	1
N Scotland					
Loch of Strathbeg	88	32	-64.8		
Sands of Forvie	401	860	+114.5	380 (395)	15
NE England					
Coquet Island	2,272	2,464	+8.5	2,941 (966)	16
Farne Islands	216	301	+40.4	113 (68)	17
Fairburn Ings	250	210	-16.0	250	1
E England					
Scolt Head	*c.*2,700	*c.*2,250	-16.7	1,912 (836)	3
Blakeney Point	*c.*750	*c.*800	+6.7	363 (363)	2
Snettisham	1,294	1,970	+52.2	1,294	1
Minsmere	183	126	-31.1	296 (201)	4
Havergate	246	450	+82.9	354 (471)	6
SE England					
Rye Harbour	800	1,075	+34.4	444 (333)	15
Dungeness	70	15	-78.6	442 (384)	10
Chichester Harbour	160	2	-98.8	1,025 (604)	12
Langstone Harbour	4,479	4,590	+2.5	1,323 (1,535)	14
North Solent NNR	120	*c.*1,000	+733.3	6,112 (2,113)	18
Hayling Oysterbeds	21	68	+223.8	21	1
SW England					
Brownsea Island	107	165	+54.2	116 (63)	9
NW England					
Leighton Moss	1,367	1,463	+7.0	1,367	1
Hodbarrow	400	400	0.0	295 (383)	10
Rockliffe Marsh	12	3	-75.0	640 (456)	7
Dee Estuary	150	650	+333.3	150	1
NE Ireland					
Strangford Lough	3,049	3,452	+13.2	4,291 (1,478)	18
Big Copeland Island	260	275	+5.8	235 (128)	6

Numbers increased by 20% since 2003 in **south-east England**, where large proportional changes took place at several colonies. Increases were noted at Rye Harbour, where numbers were the highest since 1987, and in the small colony at Hayling Oysterbeds. There was limited sign of recovery at North Solent NNR, where close to 1,000 pairs were estimated to have nested in 2004. In 2003, fewer than 120 pairs nested (*cf.* 6,524 pairs in 2002) due to disturbance by a pair of peregrine falcons *Falco peregrinus* that took up residence on an island in the colony. Peregrines were again present in 2004, causing disruption early in the season, but they had abandoned the site by early May allowing the gulls to settle (B. Lord, pers. comm.). At Dungeness, with only 15 pairs, the long-term decline continued, from 1,100 pairs in 1994. The largest decrease occurred at Chichester Harbour, where only two pairs

nested, compared with 160 in 2003. Numbers appeared to be stable in the largest colony, at Langstone Harbour. Elsewhere in the region, 953 pairs nested at Newton NNR, an increase of 10% since 1999. Breeding success was generally moderate to good, except at Chichester Harbour and Dungeness, where small numbers nested and failed, and at North Solent, where foxes *Vulpes vulpes* depredated many nests. Productivity at Rye and Langstone harbours was above average.

Table 3.12.3 Breeding success (chicks fledged per pair) of black-headed gull 2003-2004 and 1986-2003 at selected colonies mentioned in the text. Figures in parentheses under 2001 and 2002 are the number of nests from which the success estimates were derived.

Region/Site	2003	2004	1986-2003	
			Mean (±s.e.)	No. of years
Orkney				
Egilsay	0.74 (35)	0.05 (154)	0.33 (0.16)	4
Shapinsay	*c.*0.39 (516)	1.06 (425)	0.34 (0.05)	2
NE England				
Coquet Island	1.18 (2,272)	1.05 (2,464)	1.35 (0.09)	8
E England				
Blakeney Point	*c.*0.20 (750)	*c.*0.56 (800)	0.15 (0.05)	2
Scolt Head	*c.*1.02 (2,700)	*c.*0.78 (2,250)	1.02	1
Foulness	-	0.27 (30)	0.44	1
SE England				
Rye Harbour	*c.*1.06 *(*800)	*c.*0.98 (1,075)	0.76 (0.19)	10
Chichester	0.30 (160)	0.00 (2)	0.29 (0.14)	6
Langstone Harbour	0.28 (4,479)	0.88 (4,590)	0.58 (0.13)	10
Hayling Oysterbeds	0.91 (21)	0.59 (68)	0.91	1
Newtown Estuary NNR	-	*c.*0.64 (953)	0.71 (0.30)	5
SW England				
Brownsea Island	0.70 (107)	0.85 (165)	0.39 (0.16)	3
NW England				
Rockcliffe Marsh	0.08 (12)	0.33 (3)	0.06 (0.01)	3
NE Ireland				
Big Copeland Island	-	0.17 (275)	-	-

In **south-west England**, numbers increased substantially at the only colony monitored, Brownsea Island, where breeding success also improved since 2003 despite failures due to inclement weather and predation of nests by brown rats *Rattus norwegicus* (C. Thain, pers. comm.). In **north-west England**, numbers at monitored colonies increased by 30% overall since 2003. On the Dee Estuary, the number more than tripled. The now small colony at Rockcliffe Marsh, that held almost 1,300 pairs in 1989, had only three pairs in 2004 and fledged only a single chick. There was little or no change in numbers at Hodbarrow and a minimal change in the large colony at Leighton Moss.

Data on breeding numbers in **north-east Ireland** indicated an increase of 13% between 2003 and 2004. Numbers at Strangford Lough increased by 13% over this period: 3,452 pairs was the highest count there since 1998. On Big Copeland Island, where numbers appeared to be stable compared with 2003, breeding success was low with only 47 chicks fledging from 275 pairs (0.17 chicks per nest).

3.13 Mew gull *Larus canus*

Sample populations of SW and NW Scotland remained stable between 2003 and 2004, but a large decrease of 30%, occurred in Orkney. Numbers in N Scotland and NE Ireland increased by about 30%, with a smaller increase in Shetland. Breeding success was generally low throughout, except at some sites in Orkney and at those on the west coast of Scotland where mink control measures were in operation. Mink were found to have decreased productivity by 27% at unprotected sites.

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

Between 2003 and 2004, numbers had changed little 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. In the Mink-Seabird Project study area (Mallaig to Tarbert on the Kintyre peninsula) spread over both regions, 48 sites surveyed held a minimum of 1,144 pairs. Breeding success was again enhanced by efforts to control mink. At 15 colonies where mink were successfully controlled productivity was estimated to be 0.66 chicks fledged per pair (*c.*504 chicks from 761 pairs) contrasting with those 10 colonies with no (or unsuccessful) mink control that fledged an average of only 0.48 chicks per pair (*c.*138 chicks from 285 pairs). This suggested that mink reduced productivity by 27% at unprotected colonies (Craik 2004). Between 1996 and 2003, the average apparent reduction in productivity of mew gulls due to mink predation was 55% (range 36-76%).

Table 3.13.1 Regional population changes at monitored mew gull colonies, 2003-2004. Figures are breeding pairs, apparently incubating adults or apparently occupied nests in May-June. Regional samples of less than 50 pairs are excluded.

Region	2003	2004	2003-2004 % change
SW Scotland [a]	*c.*924	*c.*989	+7.0
NW Scotland [b]	*c.*337	*c.*343	+1.8
Shetland [c]	46	53	+15.2
Orkney [d]	419	293	-30.1
N Scotland [e]	111	146	+31.5
NE Ireland [f]	134	171	+27.6

Colonies: [a] Suite of 28 small islets in Argyll and Bute; Tiree Reef, Loch Gruinart, Sanda; [b] Suite of 10 small islets in Lochaber; Eigg, Canna, Handa; [c] Hildasay, Mousa, Fair Isle; [d] North, Hill, Hobbister, Loch of Banks, The Loons, Brodgar, Rendall Moss; [e] North Sutor, Alness Point; [f] Strangford Lough, Isle of Muck.

In **Shetland**, overall numbers increased by 15%, although the number of colonies sampled was small. The number nesting at Hildasay (30 pairs) was close to that recorded in 2003 and breeding success there improved; over 20 chicks fledged compared with few in previous years (Okill 2004b). On Mousa, the small colony increased by three pairs to 10 in 2004, which fledged 11 chicks. Visits to several other colonies indicated that Hildasay and Mousa were perhaps exceptions as only small numbers of chicks were found elsewhere. On Fair Isle, the number increased from five pairs in 2003 to 13 in 2004, the highest count there in 19 years of monitoring. Although breeding success was again low (just 2 chicks fledged) this was a relatively successful season for this island, where only one fledged in the previous three years (Shaw *et al.* 2004).

In **Orkney,** the total number at sampled colonies fell by 30%, including a large decrease at North Hill, Hobbister, Loch of Banks and The Loons. Breeding success was also low at North Hill, and also at Whaness, although colonies at Hoxa and Burray Haas appeared to have greater success fledging young

where productivity was 0.67 and 1.00 chicks fledged per pair respectively. Anecdotal evidence suggested complete failure on Auskerry but moderate success at Hunda, Deerness and on Hoy (E. Meek, pers. comm.).

Table 3.13.2 Population changes of mew gull 2003-2004 and 1986-2003 at selected sites referred to in the text. Figures are apparently occupied nests, apparently occupied territories or pairs.

Region/sites	2003	2004	2003-2004 % change	1986-2003 Mean (±s.d.)	1986-2003 No. years
SW Scotland					
Kilmaronag	315	304	-3.5	312 (39)	13
Glas Eilean	50	60	+20.0	69 (19)	10
Eilean an Ruisg	58	61	+5.2	39 (13)	13
Aird's Islet	33	30	-9.1	24 (7)	11
Abbot Island	22	31	+40.9	24 (11)	12
Ban Eileanan	40	27	-32.5	55 (15)	8
Eilean Inshaig	31	32	+3.2	31 (19)	13
Tucker's Islet	86	110	+27.9	88 (11)	10
Sanda	82	78	-4.9	50 (16)	11
The Reef, Tiree	49	69	+40.8	49	1
NW Scotland					
Handa	31	30	-3.2	13 (6)	13
Eigg	74	80	+8.1	63 (8)	17
Eilean Nan Gall	13	33	+153.8	12 (6)	11
Ballachulish Beach	72	53	-26.4	64 (8)	4
Eilean Munde	23	45	+95.6	12 (9)	9
Eilean Dubh	27	17	-37.0	19 (14)	11
Sgeirean Sallachain	28	10	-67.8	18 (13)	13
Shetland					
Hildasay	34	30	-11.8	19 (10)	4
Fair Isle	5	13	+160.0	8 (2)	18
Orkney					
North Hill	35	13	-62.9	46 (21)	4
Hobbister	58	22	-62.1	43 (21)	2
Loch of Banks	45	31	-31.1	35 (14)	2
The Loons	265	215	-18.9	323 (82)	2
N Scotland					
Nigg	81	126	+55.6	59 (46)	14
Alness Point	30	20	-33.3	80 (22)	8
SE England					
Dungeness	11	11	0.0	11 (1)	7
NE Ireland					
Strangford Lough	133	167	+25.6	86 (38)	17

In **north Scotland**, overall numbers increased by 32% between 2003 and 2004. At Nigg, numbers increased by 56% to 126 pairs, following the 43% decrease between 2002 and 2003, but a decrease was recorded at Alness Point, where numbers fell by one-third. Breeding success was below average at both sites. Just five young fledged from 122 monitored nests at Nigg where chick mortality followed severe rain storms (Swann 2004b) and no chicks fledged at Alness Point for the fourth successive year, due to human disturbance (A. Ramsey, pers. comm.).

Few mew gulls nest in England. Data were received from small colonies at Scolt Head and Blakeney Point (**east England**), where a total of nine pairs fledged no young, due to wet weather and a lack of food. Numbers increased in **north-east Ireland**, where a count of 167 pairs at Strangford Lough was the highest on record. On Big Copeland Island, productivity was estimated at 100 chicks from 225 pairs (N. McKee, pers. comm.).

Table 3.13.3 Breeding success (chicks per pair) of mew gulls 2003-2004 and 1986-2003 at selected colonies mentioned in the text. Figures in parentheses under 2001 and 2002 are the number of nests from which the estimates of success are derived.

Region/sites	2003	2004	1986-2003	
			Mean (±s.e.)	No. years
Shetland				
Mousa	-	1.11 (10)	-	-
Fair Isle	0.20 (5)	0.15 (13)	0.49 (0.09)	15
Orkney				
Papa Westray	-	0.15 (13)	-	-
Whaness	*c.*1.12	*c.*0.24 (200)	1.12	1
Hoxa Head	-	0.67 (18)	-	-
Burray Haas	-	*c.*1.00 (25)	-	-
N Scotland				
Nigg	0.85 (47)	0.04 (122)	1.05 (0.09)	8
Alness Point	0.00 (30)	0.00 (20)	0.53 (0.20)	8
E England				
Blakeney Point	0.00 (3)	0.00 (3)	0.00	1
Scolt Head	0.60 (5)	0.00 (6)	0.60	1
NE Ireland				
Big Copeland Island	*c.*0.30 (297)	*c.*0.44 (225)	0.30	1

3.14 Lesser black-backed gull *Larus fuscus*

The number of lesser black-backed gulls breeding in sample colonies in SW Scotland, Orkney and SE Scotland, declined between 2003 and 2004, but remained stable in E England and Wales and increased in NE Ireland. Few breeding success data were collected, but productivity was relatively high on Bardsey although low at other Welsh colonies. Predation by mink continued to depress productivity in SW Scotland.

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

In **south-west Scotland**, the total number breeding at sample colonies decreased by 18% between 2003 and 2004, continuing the decline in this area since 2000. In the Mink-Seabird Project study area (Mallaig to Tarbert on the Kintyre peninsula) 13 monitored sites held an estimated 359 pairs. At three of the largest colonies - Reisa MhicPhaidean, Eilean Gamhna and Eilean Mor - each of which held 100-150 pairs, changes of +76%, -10% and -60%, respectively, were noted since 2003. Limited breeding success data from six colonies suggested that at the three where mink were controlled, a mean of 0.69 chicks fledged per pair compared with 0.44 chicks fledged per pair at sites with no, or unsuccessful, mink control (Craik 2004). Outside the study area, the population on Sanda was at its lowest level since 1986. Decreases were also noted on Eigg and Canna (**north-west Scotland**). The number on Canna was the lowest on record and approximately one-third of what usually nests there (Swann 2004a).

Table 3.14.1 Regional population changes at monitored lesser black-backed gull colonies, 2003-2004. Figures are breeding pairs, apparently incubating adults or apparently occupied nests in May-June. Regional samples < 100 pairs are excluded.

Region/site	2003	2004	2003-2004 % change
SW Scotland [a]	499	*c.*411	-17.6
Orkney [b]	135	116	-14.7
SE Scotland [c]	1,690	1,448	-14.3
E England [d]	251	266	+6.0
Wales [e]	14,310	14,590	+2.0
NE Ireland [f]	290	*c.*335	+15.5

Colonies: [a] Suite of 13 small islets in Argylle and Bute; Kirkconnel Merse, Lunga, Sanda; [b] North Hill, Hobbister; [c] Isle of May, Haystack, The Lamb, Inchmickery, Fidra; [d] Havergate, Minsmere; [e] Caldey, Stackpole, St Margaret's Island, Skomer, Skokholm, Bardsey, Ynys Gwylan Fawr, South Stack, Elegug Stacks and nearby coast; [f] Lighthouse Island, Mew Island, Strangford Lough, Isle of Muck.

Table 3.14.2 Population changes of lesser black-backed gull 2003-2004 and 1986-2003 at selected colonies referred to in the text. Figures are breeding pairs, apparently incubating adults or apparently occupied nests in May-June.

Region/site	2003	2004	2003-2004	1986-2004	
			% change	Mean (±s.d.)	No. years
SW Scotland					
Sanda	60	50	-16.7	82 (30)	11
NW Scotland					
Eigg	40	35	-12.5	37 (12)	16
Canna	31	13	-58.1	37 (5)	18
Orkney					
North Hill	11	20	+81.8	19 (9)	4
Hobbister	124	96	-21.9	104 (28)	2
N Scotland					
Nigg	6	10	+66.7	4 (2)	5
SE Scotland					
Isle of May	1,253	1,221	-2.5	1,115 (405)	18
Inchmickery	135	134	-0.7	148 (64)	7
Fidra	300	90	-70.0	326 (224)	11
E England					
Havergate	249	264	+6.0	270 (29)	2
Wales					
Skomer	11,064	11,261	+1.8	13,604 (1,709)	15
Skokholm	1,866	2,143	+14.8	3,058 (726)	16
South Stack	88	118	+34.1	61 (54)	14
Bardsey	652	532	-18.4	374 (163)	18
Caldey	594	468	-21.2	351 (205)	17
NW England					
South Walney	12,988	12,103	-6.8	17,777 (3,282)	4
NE Ireland					
Mew Island	40	50	+25.0	42 (5)	4
Old Lighthouse Island	190	200	+5.3	206 (46)	8
Strangford Lough	50	75	+50.0	102 (65)	18
Isle of Muck	10	10	0.0	14 (11)	4

The total numbers breeding at sample colonies in **Orkney** and in **south-east Scotland** showed moderate declines, including a large decline on Fidra (south-east Scotland) from 300 to 90 pairs, while the large colony on the Isle of May remained stable. Numbers on Fidra have fluctuated markedly in recent years although the general trend has been one of decline since 1998, when the colony held 660

pairs. Breeding success on the Isle of May was again low, as in 2003, and below the site mean. At Nigg Oil Terminal (**north Scotland**), the small population continues to steadily increase since colonisation of the site in 1999, when two pairs nested (Swann 2004b). In **east England**, there was little change in numbers nesting at Havergate.

In **Wales**, the sample population was stable between 2003 and 2004. Moderate increases at South Stack and on Skokholm were offset by decreases on Bardsey and Caldey, where counts were the lowest since 1999 and 1996 respectively. On Skomer, where there has been a general decline in the breeding population in recent years, numbers were similar to those in 2003, which was the lowest count on record at the site. The decline is probably due to successive years of low breeding success since 1987, coupled with a sustained reduction in adult survival since 1993. However, the decline in breeding numbers is not as much as would be expected from the extent of the decreases in breeding success and adult survival, suggesting that immigration from other colonies may have occurred (Perrins 2004). Breeding success was also low on Skokholm but relatively high on Bardsey.

Numbers of lesser black-backed gulls increased in **north-east Ireland,** with increases on Mew and Old Lighthouse and at Strangford Lough where, prior to 2004, numbers had fallen for six successive years. No change was noted in the small colony on the Isle of Muck. In **south-east Ireland**, the number on Lambay fell by 38% since 2002, from 216 to 133 pairs (S. Newton, pers. comm.).

Table 3.14.3 Breeding success (chicks fledged per pair) of lesser black-backed gull 2003-2004 and 1986-2003 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	2003	2004	1986-2003	
			Mean (±s.e.)	No. of years
SE Scotland				
Isle of May	0.53 (351)	0.59 (194)	0.87 (0.07)	15
Wales				
Skokholm	0.15 (1,866)	0.07 (2,143)	0.18 (0.02)	10
Skomer	0.41 (11,064)	0.31 (11,261)	0.25 (0.04)	15
Bardsey	0.92 (652)	0.92 (532)	0.68 (0.08)	8

Mixed colonies of lesser black-backed and herring gulls

Some of the largest colonies of lesser black-backed gulls in the UK also contain lesser numbers of herring gulls. Nests of the two species are difficult to tell apart, and as a result, monitoring of numbers and breeding success at such colonies does not distinguish between the two species. At the large inland colony at Tarnbrook Fell (**north-west England**) found an estimated 7,735 nests with eggs in 2004, similar to the number recorded in 2003 (7,531). Despite a relatively warm and dry spring, gulls were late in arriving at the colony and did so in reduced numbers, as was the case in 2003 (Sowter 2004). Counts of sub-sections indicated that nest densities had increased around the periphery of the colony, but had decreased in the core areas. On South Walney, the steep decline noted since 2002 continued, with the number of occupied nests falling from 15,965 to 15,283 between 2003 and 2004. Tthe ratio of lesser black-backed to herring gulls at the site appears to be 2.4:1 and 4:1 (J. Thompson, pers. comm.). At Rockcliffe Marsh, numbers were estimated at 2,625 pairs, an increase of *c.*17% since 2003. However, around 60% of nests were abandoned in early June, probably due to exceptionally dry weather that had persisted since April combined with a lack of food (M. Carrier, pers. comm.). Elsewhere in the region, the number of roof-nesting gulls in Carlisle fell by 62% to 340 pairs. In **north-east England**, a large increase of 58% was recorded on the Farne Islands where numbers totalled 1,330 pairs, compared with 841 in 2003 (Walton 2004). Nearby, on Coquet Island, numbers remained stable; 89 pairs were recorded compared to 87 in 2003.

3.15 Herring gull *Larus argentatus*

Numbers of breeding herring gulls decreased substantially between 2003 and 2004 at sample colonies in NE Scotland and NE and NW England. Elsewhere, only slight changes were noted, except in N Scotland, where an increase occurred. The relatively few colonies at which estimates of productivity were made suggest a moderately successful year, except on Canna and Skokholm. In NW and SW Scotland, it was estimated that mink lowered productivity at unprotected sites by over 40%.

Breeding numbers and breeding success (Tables 3.15.1 and 3.15.2)

North-Scotland was the only region where a sizeable increase was recorded between 2003 and 2004. However, only one colony is monitored there – at Nigg – where a 29% increase was recorded. The population at this site has increased steadily since the formation of the colony in 1990, although a particularly steep rise was noted between 1999 and 2000, when numbers increased from 73 to 208 pairs (Swann 2004b).

Table 3.15.1 Regional population changes at monitored herring gull colonies, 2003-2004. Figures are breeding pairs or apparently occupied nests in May-June. Regional samples < 200 pairs are excluded.

Region/site	2003	2004	2003-2004 % change
SW Scotland [a]	*c.*5,071	*c.*4,672	-7.9
NW Scotland [b]	*c.*1,447	*c.*1,389	-4.0
N Scotland [c]	231	298	+29.0
NE Scotland [d]	405	218	-46.2
SE Scotland [e]	4,519	4,306	-4.7
NE England [f]	515	361	-29.9
Wales [g]	4,523	4,347	-3.9
NW England [h]	301	225	-25.2
NE Ireland [i]	609	555	-8.9

Colonies: [a] Suite of 35 islets in Argyll and Bute; Lunga, Sanda, Mull of Galloway; [b] Suite of 8 islets in Lochaber; Handa, 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] Caldey, Elegug Stacks and nearby coast, Stackpole Head, Skomer, Middleholm, Skokholm, St Margaret's Island, Bardsey, Ynys Gwylan Fawr, South Stack.; [h] St Bee's Head, Hodbarrow; [i] Strangford Lough, Copeland Islands, Isle of Muck.

Sample populations in the majority of regions showed little change between 2003 and 2004. In **south-west** and **north-west Scotland,** numbers appeared to be stable, with minor changes of -8% and -4% recorded, respectively. Particularly notable was the decrease on Canna, where the number fell for the fourth successive year, having declined by 71% since 2000. The population on Canna is smaller than at any time since 1971, with many sub-colonies on the island now abandoned (Swann 2004a). Breeding success on the island was low for the third successive year, with most nests failing at the egg or early chick stage. Further afield, numbers on Sanda were stable between 2003 and 2004. In the Mink-Seabird Project study area (Mallaig to Tarbert on the Kintyre peninsula), spread over both regions, mean productivity across 13 sites where mink were successfully removed was 0.90 chicks per AON, from an estimated 1,663 pairs. This compared with a success of 0.52 chicks per AON from 19 sites with no (or unsuccessful) mink control, that held an estimated 2,212 pairs. Thus it appears that mink reduced herring gull productivity at these sites by about 42% in 2004 (Craik 2004).

Table 3.15.2 Population changes of herring gull 2003-2004 and 1986-2003 mean of selected colonies referred to in the text. Figures are breeding pairs or apparently occupied nests in May-June

Region/site	2003	2004		1986-2003	
				Mean (±s.d.)	No. years
SW Scotland					
Sanda	610	630	+3.3	797 (130)	8
NW Scotland					
Canna	587	372	-36.6	1,226 (240)	17
Eigg	300	300	0.0	388 (108)	15
Shetland					
Noss	45	23	-48.9	72 (15)	18
Orkney					
Hobbister	110	104	-5.4	92 (26)	2
N Scotland					
Nigg	231	298	+29.0	75 (104)	14
NE Scotland					
Sands of Forvie	401	217	-45.9	407 (138)	7
SE Scotland					
Isle of May	2,559	2,428	-5.1	2,277 (572)	18
Inchgarvie	254	189	-25.6	204 (69)	13
Inchmickery	413	313	-24.2	236 (129)	9
Haystack	46	30	-34.6	127 (83)	8
The Lamb	17	12	-29.4	47 (8)	15
Fidra	900	1,035	+15.0	1,137 (409)	11
St Abb's Head	298	261	-12.4	389 (156)	18
NE England					
Boulby Cliffs	470	325	-30.8	415 (97)	16
Longnewton Reservoir	17	21	+23.5	27 (10)	9
Saltburn	28	15	-46.4	134 (73)	16
E England					
Havergate	41	47	+14.6	41	1
SE England					
Dungeness	59	62	+5.1	79 (29)	5
SW England					
Durlston-St Aldhelm's Head	98	93	-5.1	82 (19)	6
Ballard	21	23	+8.7	14 (6)	6
Wales					
Caldey Island	1,787	1,704	-4.6	1,286 (475)	17
Stackpole Head	120	155	+29.2	74 (28)	18
Elegug Stacks	131	122	-6.7	106 (20)	10
Skomer	458	468	+2.2	470 (106)	17
Middleholm	97	103	+6.2	105 (21)	7
Skokholm	278	287	+3.2	330 (57)	18
St Margaret's Island	222	299	+34.7	214 (101)	9
Bardsey	621	543	-12.6	422 (155)	18
Ynys Gwylan Fawr	215	169	-21.4	179 (47)	11
South Stack	470	398	-15.3	329 (131)	11
NW England					
St Bee's Head	299	220	-26.4	526 (115)	17
NE Ireland					
Strangford Lough	207	302	+50.7	718 (526)	18
Big Copeland	260	125	-51.9	234 (50)	4
Lighthouse Island	90	25	-72.2	93 (9)	7
Mew Island	30	75	+150.0	21 (8)	4
Isle of Muck	22	28	+27.3	75 (95)	3

Few sizeable colonies were monitored in the Northern Isles in 2004. On Noss (**Shetland**), numbers were approximately half those recorded in 2003 but productivity was the highest on record. At Hobbister, the largest colony in **Orkney** from which data were received, numbers remained similar to those recorded in 2003.

Along the east coast, notable declines were recorded in the sample populations of **north-east Scotland** and **north-east England**, where substantial declines were recorded at the Sands of Forvie and Boulby Cliffs and in the small colony at Saltburn (but see account for mixed colonies in north-east England, under Section 3.14). In **south-east Scotland,** numbers appeared to be stable, compared with 2003. Notable decreases occurred at several colonies but were offset by an increase at the larger colony on Fidra, suggesting movement took place between some nearby colonies in the Firth of Forth. On the Isle of May, where numbers appeared to be stable, breeding success was above average. Few colonies were monitored in other east coast or south coast regions of the UK. Between 2003 and 2004, an increase was recorded in the small colony at Havergate (**east England**), with numbers apparently stable at Dungeness (**south-east England**), Ballard and between Durlston and St Aldhelm's heads (both **south-west England**).

Table 3.15.3 Breeding success (chicks fledged per pair) of herring gull 2003-2004 and 1986-2003 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	2003	2004	1986-2003	
			Mean (±s.e.)	No. of years
NW Scotland				
Canna	0.05 (587)	0.16 (372)	0.82 (0.17)	14
Shetland				
Noss	0.93 (45)	1.39 (23)	0.67 (0.12)	6
SE Scotland				
Isle of May	1.02 (151)	1.14 (160)	1.00 (0.08)	15
Wales				
Skokholm	0.39 (278)	0.18 (114)	0.75 (0.12)	10
Skomer	0.62 (47)	0.78 (54)	0.76 (0.11)	9
Bardsey	1.34 (621)	1.20 (543)	1.25 (0.12)	8
Ynysoedd Gwylan	1.40 (285)	1.41 (189)	1.12 (0.08)	5

A moderate decline also occurred in **north-west England**, where the one sizeable colony monitored, at St Bee's Head, decreased by 26% (but see also the account for mixed colonies in north-west England, under Section 3.14). Numbers in other regions bordering the Irish Sea were comparable to those recorded in 2003 although typically there was variation between colonies. In **Wales**, moderate increases were recorded at Stackpole Head (highest count on record) and on St Margaret's Island. Moderate decreases occurred at Bardsey, Ynys Gwylan Fawr and South Stack but changes noted at six other colonies were minor. Productivity measurements, undertaken at four colonies, indicated an average year. Success was high at Bardsey and nearby Ynysoedd Gwylan (Ynys Gwylan Fawr and Bach combined), and above average at the latter site. Birds on Skomer were less successful although productivity was close to the site mean. Only on Skokholm were birds relatively unsuccessful; indeed 2004 saw the lowest figure on record there. In **north-east Ireland**, a large increase was noted at Strangford Lough, where numbers were at their highest since 1999. In the Copeland Islands, large decreases were recorded on Big Copeland and Old Lighthouse islands, although the population on nearby Mew Island more than doubled (perhaps as a result of birds moving from the two islands previously mentioned). An increase was also noted on the small colony on the Isle of Muck, but numbers are still one sixth of those in 1995. A complete count of the colony on Lambay (**south-east Ireland**) revealed numbers had decreased by 13% since 2002, from 358 pairs to 311 (S. Newton, pers. comm.).

3.16 Great black-backed gull *Larus marinus*

Large decreases were noted between 2003 and 2004, in the number of great black-backed gulls breeding at sample colonies in two regions bordering the North Sea, while a moderate increase occurred in Wales. Numbers at sample colonies in other regions were stable. Breeding success was high in Wales and at some other colonies in southern Britain, although few pairs nest there. In more northern colonies, success was generally low, except at North Hill (Orkney). In SW and NW Scotland, there was little overall difference in breeding success between colonies with and without mink control, in contrast to other gull species that have clearly benefited from the removal of these predators.

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

In **south-west** and **north-west Scotland**, total numbers were similar to those in 2003. In the Mink-Seabird Project study area (Mallaig to Tarbert on the Kintyre peninsula), a minimum of 367 pairs were found at 42 sites, and another 11 former sites were deserted in 2004. At 27 sites where productivity was monitored, breeding success averaged *c.*1.06 across 148 nests. Mink control was carried out at nine of these sites, where productivity was 1.12 young per pair from 59 nests, compared with 1.02 chicks per pair from 89 nests at 18 sites with no (or unsuccessful) mink control (Craik 2004). The difference suggests that mink reduced productivity in this species by 9%, far less than that found for other gulls (this report) probably due to the more aggressive adults. Outwith this study area, increases were noted on Lunga, and on Eigg, where numbers declined successively over the three years prior to 2004. A substantial decline was noted on Canna, where the population reached its lowest level since 1986 (Swann 2004a). There was little change in numbers on Handa and Sanda.

Table 3.16.1 Regional population changes at monitored great black-backed gull colonies, 2003-2004. Figures are breeding pairs or apparently occupied nests in May-June. Regional samples of < 50 pairs are excluded.

Region	2003	2004	2003-2004 % change
SW Scotland [a]	*c.*345	*c.*337	-2.3
NW Scotland [b]	154	162	+5.2
Shetland [c]	80	77	-3.8
Orkney [d]	467	342	-26.8
N Scotland [e]	159	111	-30.2
Wales [f]	280	347	+23.9

Colonies: [a] Suite of 29 small islets in Argyll and Bute, Sanda, Lunga; [b] Suite of 5 small islets in Lochaber, Eigg, Canna, Handa; [c] Hermaness, Noss, Mousa; [d] North Hill, Copinsay, Hobbister; [e] Nigg; [f] Caldey, Skomer, Skokholm, Middleholm, Stackpole Head plus Elegug Stacks, South Stack, Bardsey, Ynys Gwylan Fawr, St Margaret's Island, Valley Lakes.

Total numbers in **Shetland** in 2004 were comparable to 2003. On Noss, 52 nesting pairs was the second lowest count on record, but a moderate proportional increase was noted at the small colony on Mousa. At both sites, fledging rate was reported as high, with 20 chicks fledging on Mousa although on Noss thick vegetation prevented direct observation of success (Sykes and Bliss 2004). Elsewhere, evidence pointed to low productivity; at High Holm there was a minimum of 32 pairs but despite extensive searching only a single chick was found; at Papa Stour those few pairs still on territory in early July had all failed (Okill 2004b). A large decline appears to have occurred at Ramna Stacks; 303 individuals were on Gruney during the breeding season in 1986, compared with 5 pairs in 2004.

In **Orkney**, total numbers decreased by one quarter between 2003 and 2004. Moderate decreases were noted on Papa Westray at North Hill and in the large colony on Copinsay; the smaller colony at Hobbister increased. Other data suggest a long term decline. On Hoy, the colony at Stourdale was found to contain 65 pairs compared with 260 pairs in 1998; and on the Calf of Eday the formerly large colony (e.g. 938 nests found in 1996) contained no more than 100 pairs (Meek 2004). Breeding

success appeared to be low, except at North Hill where 0.62 chicks fledged per pair. Although 40 well-grown chicks were found at Stourdale, most were underweight and it was considered survival would be low, while at Sandy Loch (also Hoy) six pairs fledged no young. Furthermore, few young were seen on the Calf of Eday. However, breeding success on Swona and at Mull Head was thought to have been higher than in 2003.

A similar decline to that in Orkney was apparent in **north Scotland**. At the sole monitored colony, at Nigg, numbers fell by 30% to the lowest level since 1998. Complete breeding failure occurred there for the second successive year, probably due to low availability of sandeels, also the reason suggested for the complete failure in 2003 (Swann 2004b).

Along the rest of the east and south-east coast of Britain, the great black-backed gull is a scarce breeding species (Mitchell *et al.* 2004), so few colonies are available for monitoring. The largest of those covered regularly in this area is on the Isle of May (**south-east Scotland**), where numbers remained similar to 2003. Elsewhere in this region, small numbers nested on 12 other islands in the Firth of Fourth; 13 pairs were found in 2004 compared with 14 in 2003. Numbers were also stable on the Farne Islands, where seven pairs nested, one fewer than in 2003. The only productivity data available from this stretch of coast came from Dungeness (**south-east England**), colonised in 2003, where two pairs fledged one chick each.

Table 3.16.2 Population change of great black-backed gull 2003-2004 and 1986-2003 at selected colonies mentioned in the text. Figures are breeding pairs, apparently incubating adults or apparently occupied nests in May-June.

Region/Site	2003	2004	2003-2004	1986-2003	
			% change	Mean (±s.d.)	No. of years
SW Scotland					
Sanda	30	28	-6.7	35 (8)	12
Lunga	37	42	+13.5	53 (14)	11
NW Scotland					
Eigg	9	18	+100.0	16 (6)	16
Canna	60	44	-26.7	77 (10)	18
Handa	39	40	+2.6	36 (9)	14
Shetland					
Noss	58	52	-10.3	69 (14)	18
Mousa	14	19	+35.7	12 (5)	3
Orkney					
North Hill	57	37	-35.1	67 (17)	4
Copinsay	396	287	-27.5	350 (64)	2
Hobbister	14	18	+28.6	27 (8)	2
N Scotland					
Nigg	159	111	-30.2	100 (55)	14
SE Scotland					
Isle of May	23	25	+8.7	14 (8)	12
Wales					
Skokholm	65	71	+9.2	41 (14)	13
Skomer	84	95	+13.1	53 (18)	18
Middleholm	32	64	+100.0	36 (14)	10
St Margaret's Island	36	51	+41.7	36 (14)	10
Ynys Gwylan Fawr	41	47	+14.6	41 (19)	10
NW England					
Rockcliffe Marsh	37	20	-46.0	42 (9)	4
NE Ireland					
Strangford Lough	34	44	+29.4	58 (23)	18

In contrast to most regions, numbers in **Wales** increased between 2003 and 2004. Increases were noted at all colonies, mostly in the region of 9-15%, although increases were larger on St Margaret's Island and on Middleholm. Numbers on both Skokholm and Skomer were the highest on record. Productivity data for 2004 again suggested that Welsh colonies were more successful than most others, with breeding success greater than or equal to the mean on Skomer, Ynys Gwylan Fawr and Bardsey, although few pairs nest at the last site. On Skokholm, success was below average but close to that recorded in 2003.

Few other colonies were monitored in western regions. At Rockcliffe Marsh (**north-west England**), there were just 20 pairs, fewer than half of those in 2001. In south-west England, small colonies were monitored at Ballard (where breeding success was high) and Brownsea Island (where no young fledged, due to bad weather). The recovery continued at Strangford Lough (**north-east Ireland**) following the crash which saw only one pair nest in 2001. In **south-east Ireland**, numbers on Lambay increased from 2002 by 32% to 145 pairs (S. Newton, pers. comm.).

Table 3.16.3 Breeding success of great black-backed gull (chicks fledged per pair) 2003-2004 and 1986-2003 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	2003	2004	1986-2003	
			Mean (±s.e.)	No. of years
NW Scotland				
Canna	0.35 (34)	0.27 (30)	0.87 (0.22)	7
Orkney				
North Hill	-	0.62 (37)	1.10 (0.31)	2
Sandy Loch	0.25 (4)	0.00 (6)	0.25	1
N Scotland				
Nigg	0.00 (159)	0.00 (111)	1.58 (0.19)	13
SE England				
Dungeness	2.00 (1)	1.00 (2)	2.00	1
SW England				
Ballard	1.83 (6)	1.83 (6)	1.22 (0.31)	3
Brownsea	1.00 (2)	0.00 (2)	1.00	1
Wales				
Skokholm	0.91 (65)	0.93 (71)	1.17 (0.08)	12
Skomer	1.40 (25)	1.60 (25)	1.24 (0.06)	8
Bardsey	2.00 (3)	2.33 (3)	1.70 (0.35)	7
Ynys Gwylan Fawr	1.12 (41)	1.66 (47)	1.66 (0.04)	4

3.17 Black-legged kittiwake *Rissa tridactyla*

Numbers of black-legged kittiwakes breeding at sample colonies declined in all regions between 2003 and 2004, except in NW and SW Scotland, to reach or approach their lowest levels since the SMP started in 1986. Overall, breeding success too was the lowest in the history of the SMP, and was particularly poor in the Northern Isles, where breeding failure occurred in Orkney for the first time. The more successful colonies were in south-east Scotland and Wales.

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 always necessarily reflect larger scale regional population changes.

In **Shetland**, few colonies were counted in 2004 (due to a persistent sea swell in June), but the results from those that were counted suggested a continuing decline. On Foula - by far the largest colony counted in 2004 - a decrease of 13% occurred since 2003 (though the count date in 2004 was later than recommended; S. Gear, pers. comm.). A particularly large (48%) decline occurred in the number of pairs breeding in the productivity plots on Fair Isle between 2003 and 2004. Isolated pairs of kittiwakes were seen in various locations in Shetland that were not previously occupied, emphasising the need to survey all suitable stretches of coastline periodically, in addition to established colonies (Heubeck 2004). It should be noted that because comprehensive counts of kittiwakes across Shetland are achieved only within a three year period (not annually), indices are presented triennially for this region.

Table 3.17.1 Regional population changes at monitored black-legged kittiwake colonies, 2003-2004 (apparently occupied nests in late May or June) and 1986-2003 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 <500 AON are excluded. Average annual rates of change for 1986-2003 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<0.05, ***P<0.001.

Region	2003	2004	2003-2004 % change	% annual change
SW Scotland [a]	1,289	1,326	+2.9	+3.2*** 1986-2003
NW Scotland [b]	1,971	2,048	+3.9	-1.4* 1986-2003
Shetland [c]	2,224	1,903	-14.4	-9.9*** 1985-2002
NE Scotland [d]	759	801	+5.5	-2.9 n.s. 1986-2004
SE Scotland [e]	12,095	12,042	-0.4	-4.4*** 1986-2003
NE England [f]	10,505	9,813	-6.6	-1.4 * 1986-2003
SE England [g]	556	348	-37.4	-6.2*** 1986-2003
Wales [h]	2,791	2,091	-25.1	-1.2*** 1986-2003
NW England [i]	1,020	976	-4.3	+0.5 n.s. 1986-2003
SE Ireland [j]	829	755	-8.9	+0.5 n.s. 1986-2003
NW Ireland [k]	1,073	895	-16.6	-

Colonies: [a] Lunga, Colonsay, Mull of Galloway, Sanda; [b] Canna, Handa (productivity plots); [c] Sumburgh Head, Noness, Noss, 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, Huntcliff, Boulby Cliffs, Hartlepool; [g] Fan Bay-West Langdon Cliffs; [h] South Stack, Bardsey, Caldey, St Margaret's Island, Skomer, Elegug Stacks; [i] St Bee's Head; [j] Dunmore East; [k] Downpatrick Head.

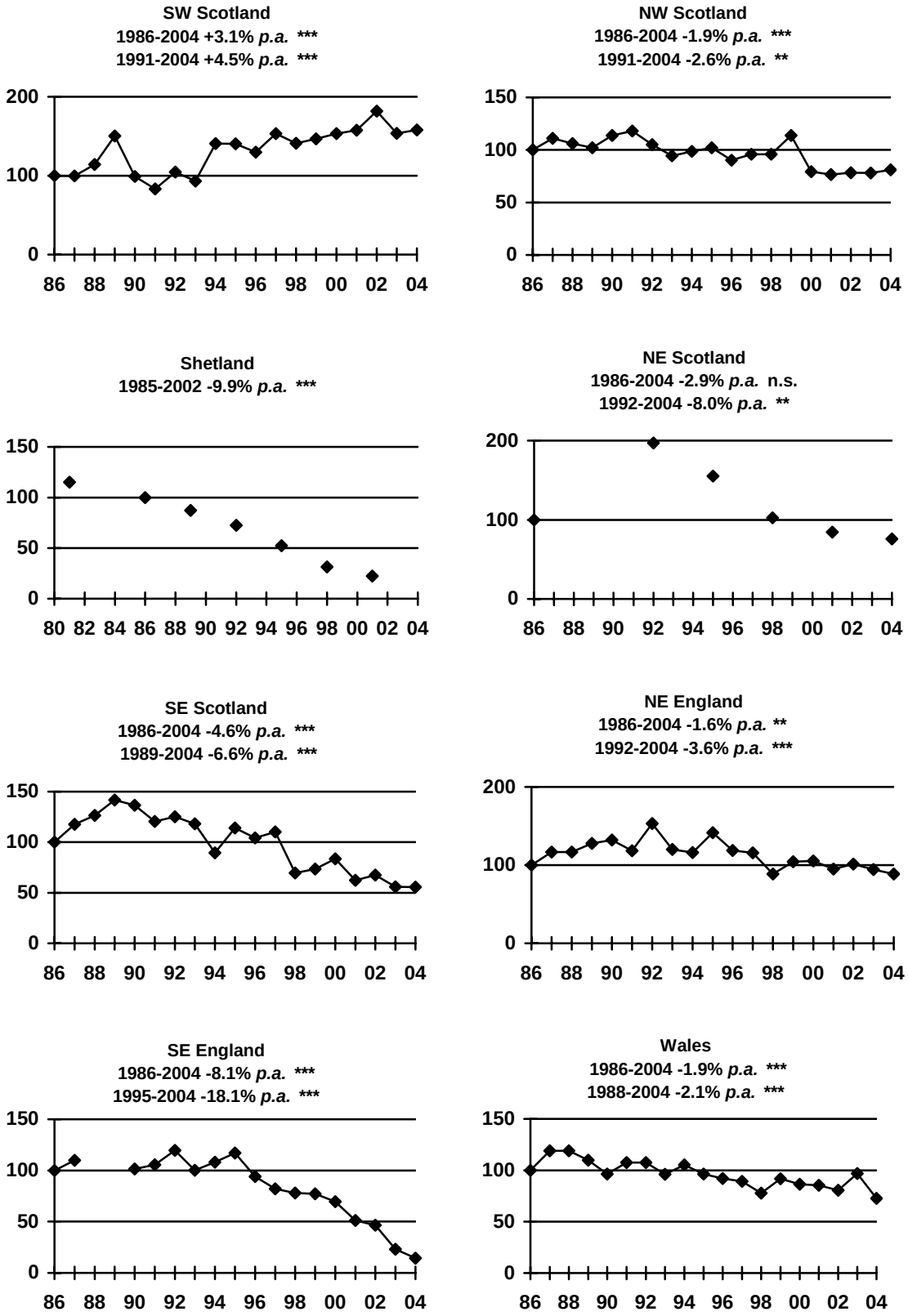

Figure 3.17.1 Regional population indices for breeding black-legged kittiwakes, 1986-2004 (apparently occupied nests in June). Average annual rates of change were calculated by regression of natural log of index against year (see section 1.2.2. for details). Statistical significance of trends (t-test) indicated as: n.s. not significant, ** P < 0.01, *** P<0.001. For Shetland, chain indices are presented for 1981, then 1985-1987, 1988-1990, 1991-1993, 1994-1996, 1997-1999 and 2000-2002 and plotted as the middle year of each three-year group.

In **Orkney**, few whole colony counts were made, though a count of a section of Marwick Head gave 1,348 AON, 53% fewer than in 2003 and 64% fewer than the previous count, in 1999. At Noup Cliffs, Westray, 4,693 AON were counted in 2004, a dramatic decrease of 73% since the previous count, in 1999, when 17,546 were present. The monitoring plot on Papa Westray held 85 AON, compared with 126 in 2003.

In **south-west Scotland**, a small increase in the regional population index occurred between 2003 and 2004, continuing the longer term trend that has prevailed there since 1991, and in contrast to most other regions (but see north-west Scotland, below). Constituent colonies showed different trends, however, with little change on Colonsay since 2002, a 27% decrease at Mull of Galloway and a 12% increase on Lunga (Treshnish Isles). The regional population index of **north-west Scotland** remained similar to the previous four years, after significant declines during the 1990s, with a small increase between 2003 and 2004. Indeed, the number breeding on Canna in 2004 reached its highest since recording there began. At North Sutor – the only colony to be monitored in **north Scotland** – the rapid decline that started in 1998 continued, with a 9% decrease since 2003.

The rate of decline in breeding number in **north-east Scotland** had slowed by 2004, after the very rapid declines during the 1990s, with the regional population index 10% lower in 2004 than in 2001, when it was last measured. Indeed, there are indications from the smaller colonies that are counted annually that the number breeding in the region reached a low in 2003 and may now have levelled off or be increasing. Greatest declines in the triennially-monitored colonies occurred at Gamrie-Pennan (-16%, from 18,482 AON in 2001 to 15,570 in 2004) and at Troup/Lion's Head (-12%, from 11,305 AON in 2001 to 9,909 in 2004). Smaller declines were noted at Buchan Ness (-5%, from 14,091 in 2001 to 13,330 in 2004) and Cruden Bay-Boddam (-8%, from 10,952 in 2001 to 10,077 in 2004).

In **south-east Scotland** the regional population index in 2004 was very similar to that of 2003, a tentative indication that the trend of decline since 1990 has slowed or levelled out. Indeed, the number breeding on the Isle of May increased by 16% after the low of 2003, to a four year high and there was an overall increase on the Firth of Forth islands. In contrast, the number of black-legged kittiwakes nesting on Bass Rock decreased substantially, and moderately so at St Abb's Head; both colonies are now smaller than at any other time during the SMP.

A small decrease was noted in the number of AON in the sample of colonies in **north-east England** between 2003 and 2004, though overall the regional population index has been rather stable - if somewhat low - since 1998. The number breeding on the Farnes was very similar to that in 2003 (and indeed the previous five years), as it was at Boulby Cliffs, though a 25% decrease at Hunt Cliff since 2003 brought this colony to below 2,000 AON for the first time since 1986. In **east England**, the colony at Sizewell declined slightly but the colony at Lowestoft increased by 20% compared with 2003. NB: the figure of 121 AON quoted in the 2003 edition of this report for Lowestoft in 2003 is incorrect and should read 96.

Colonies of black-legged kittiwakes in **south-east England** continued to decline in 2004, such that the regional population index is now just 15% of what it was in the mid 1990s and earlier. A decline of 37% occurred between 2003 and 2004. In **south-west England**, the small colonies at Blackers hole and Berry Head declined in size.

In 2003, the population index for **Wales** was the highest for nine years, but in sharp contrast, declined by 25% in 2004, the largest annual decrease and the lowest number of pairs in the history of the SMP in Wales. The largest decrease of the sizable colonies occurred on Skomer, which decreased in size by 32%, to 1,570 AON, the second lowest number breeding on the island since 1960 (only 1967 was lower). Breeding numbers at Great Ormes Head and Little Ormes Head declined by 28% and 37% over the two years 2002-2004 (no counts were made in 2003), to 720 and 387 AON, respectively – for both colonies the second lowest counts in the course of the SMP.

In **north-west England** a small decrease occurred in the number of black-legged kittiwake AON at St Bee's Head between 2003 and 2004. On the Isle of Muck (**north-east Ireland**) a moderate decrease occurred between 2003 and 2004, as it did at Dunmore (**south-east Ireland**), where the second lowest number was recorded since the SMP began. Also in southeast Ireland, a count of Lambay - one of the largest colonies in Ireland - revealed a decline of 4% since it was last counted, in 1999. At Downpatrick Head (**north-west Ireland**) a decrease of 17% occurred between 2003 and 2004.

Table 3.17.2 Population changes of black-legged kittiwake 2003-2004 and 1986-2003 at selected sites referred to in the text. Figures refer to the number of apparently occupied nests.

Region/Site	2003	2004	2003-2004 % change	1986-2003	
				Mean (±s.d.)	No. of years
Shetland					
Foula	1,081	942	-12.9	2,490 (1,162)	9
Fair Isle (plots)	463	273	-41.0	980 (327)	17
Orkney					
Marwick Head	2,873	1,348	-53.1	-	-
SW Scotland					
Mull of Galloway	291	212	-27.0	312 (67)	17
Lunga	880	985	+11.9	775 (148)	11
Colonsay	107	108	+0.9	101 (21)	9
NW Scotland					
Canna	1,290	1,340	+3.9	1,000 (204)	18
N Scotland					
North Sutor	236	214	-9.3	553 (218)	9
NE Scotland					
Covesea	347	397	+14.4	301 (112)	14
Sands of Forvie	290	242	-16.6	712 (236)	16
SE Scotland					
Isle of May	3,355	3,876	+15.5	5737 (1,658)	18
Firth of Forth islands	1,208	1,267	+4.9	1,582 (417)	10
Bass Rock	910	660	-27.5	1,607 (924)	7
St Abb's Head	6,642	6,239	-6.1	13,098 (3,635)	18
NE England					
Farne Islands	5,192	5,151	-0.8	5,692 (549)	18
Huntcliff	2,550	1,925	-24.5	4,197 (1211)	15
Boulby Cliffs	2,625	2,650	+1.0	3,588 (829)	16
E England					
Sizewell	237	214	-9.7	-	-
Lowestoft	96	115	+19.8	147 (50)	17
SE England					
South Foreland	556	348	-37.4	2,083 (664)	16
SW England					
Blacker's Hole	55	51	-7.3	59 (19)	13
Berry Head	37	20	-45.9	24 (15)	6
Wales					
Skomer	2,324	1,570	-32.4	2,278 (194)	18
Elegug	66	38	-42.4	262 (148)	14
Bardsey	290	358	+23.4	240 (49)	18
NW England					
St Bee's Head	1,020	976	-4.3	1,179 (185)	16
NE Ireland					
Isle of Muck	244	227	-7.0	371 (258)	5
SE Ireland					
Dunmore	829	755	-8.9	931 (126)	18
NW Ireland					
Downpatrick Head	1,073	895	-16.6	-	-

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 2004 averaged 0.38 (s.e. ±0.05) chicks fledged per breeding pair at 44 colonies, the lowest success rate measured in the 19 years of the SMP and nearly half the mean for the period 1986-2003 of 0.71 (s.e. ±0.02). As usual, these mean productivity estimates for the UK contain marked regional variation with regions bordering the northern North Sea generally having poorer breeding success than those lying to the south and west.

Mean productivity in **Shetland** in 2004 was 0.15 chicks per AON, which was slightly higher than in 2003, but still extremely low, being the equal sixth lowest during the entire SMP. This marks the fourth consecutive year of very poor productivity of kittiwakes in Shetland. There was a degree of variation between colonies, however, with most colonies failing to raise more than 0.00 to 0.02 chicks per AON, but pairs at Ramna Geo, Burra (0.35 chicks per AON) and especially Burravoe, Yell (0.70 chicks per AON) were more productive. Particularly unproductive (as in 2003) was the colony on Fair Isle, where 62% of the 275 study nests produced eggs, but only 1% hatched chicks, none of which fledged (Shaw *et al.* 2004). At Sumburgh Head (where just one chick fledged from a sample of 105 AON), breeding was, as in 2003, exceptionally late, suggesting poor food supply in spring (Heubeck 2004).

Table 3.17.3 Black-legged kittiwake breeding success, 2003-2004, 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	2003 chicks fledged/nest				2004 chicks fledged/nest				2003-2004 change	
	Nests[n]	Range	Mean	±s.e.	Nests[n]	Range	Mean	±s.e.	Mean[n]	±s.e.
SW Scotland [a]	169[1]	-	0.43	-	141[1]	-	0.65	-	+0.21[1]	-
NW Scotland [b]	1,230[3]	0.31-1.00	0.73	±0.21	1,227[3]	0.37-1.11	0.76	±0.21	+0.06[3]	±0.15
Shetland [c]	1,256[8]	0.00-0.11	0.02	±0.01	1,118[8]	0.00-0.70	0.15	±0.09	+0.05[7]	±0.03
Orkney [d]	1,196[7]	0.04-0.72	0.48	±0.09	934[7]	0.00-0.04	<0.01	±0.01	-0.48[7]	±0.09**
N Scotland [e]	111[1]	-	0.18	-	47[1]	-	0.00	-	-0.18[1]	-
NE Scotland [f]	669[3]	0.73-1.10	0.93	±0.10	787[3]	0.29-0.83	0.61	±0.16	-0.37[3]	±0.24
SE Scotland [g]	1,115[3]	0.77-0.97	0.86	±0.03	1,222[3]	0.27-0.57	0.37	±0.10	-0.49[3]	±0.13
NE England [h]	1,405[5]	0.25-1.69	0.88	±0.23	1,347[5]	0.10-1.11	0.47	±0.19	-0.41[5]	±0.14*
E England [I]	96[1]	-	1.26	-	115[1]	-	0.70	-	-0.56[1]	-
SW England [j]	50[1]	-	0.71		51[1]	-	0.74	-	+0.03[1]	-
NW Eng. /I. of Man [k]	-	-	-	-	30[1]	-	0.00	-	-	-
Wales [l]	1,394[4]	0.24-1.12	0.61	±0.18	1,343[4]	0.07-0.60	0.41	±0.12	+0.20[4]	±0.11
NE Ireland [m]	215[2]	1.20-1.33	1.26	±0.06	257[2]	0.64-0.88	0.76	±0.12	-0.50[2]	±0.06
SE Ireland [n]	1,288[3]	0.58-1.51	0.92	±0.29	1,188[3]	0.15-0.94	0.49	±0.23	-0.43[3]	±0.08*
NW Ireland [o]	1,073[1]	-	1.01	-	895[1]	-	1.09	-	+0.08[1]	-
Total	11,267[43]	0.00-1.69	**0.62**	±0.07	10,702[44]	0.00-1.11	**0.38**	±0.05	**-0.26[42]**	±0.05***

Colonies: [a] Ailsa Craig; [b] Canna, Handa, St Kilda; [c] Noness, Hermaness, Westerwick (2003 only), Burravoe (2004 only), 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-Newcastle, Saltburn, Bempton; [i] Lowestoft; [j] Durlston Head-St Albans Head; [k] Contrary Head-Traie Cronkan (2004 only); [l] Bardsey, Elegug Stacks, Skomer, Great Orme; [m] Isle of Muck; [n] Dunmore, Ram Head, Rockabill; [o] Downpatrck Head.

Black-legged kittiwake colonies in **Orkney** had by far their least productive breeding season in the 19 years of the SMP, with six of the seven monitored colonies failing to fledge any chicks and the other (Rousay) fledging only 3 chicks from 67 monitored nests. The virtual breeding failure in Orkney in 2004 contrasts starkly with previous years, when annual mean breeding success was no lower than the 0.48 chicks fledged per AON that was recorded in 2003. Black-legged kittiwake colonies in Shetland, by comparison, have suffered many failed or near failed breeding seasons before, most notably in 1988-1990, 1998 and 2001 to present. Breeding success of kittiwakes in Orkney and Shetland are correlated (Frederiksen *et al*. in press) however, such that a relatively poor year in Orkney will often be a poor year in Shetland; the difference is that the lows have - until 2004 – been much more pronounced in Shetland, whereas 2004 was the first year in which mean productivity in Orkney was lower than that in Shetland.

It appears that the difference in the breeding success of birds in these two regions is in part a result of movements of sandeels, which spawn around Orkney and are carried as larvae by currents into Shetland waters. In some years, however, the drift of larvae to Shetland appears to have failed, resulting in the observed breeding failures there (Wright 1996). That kittiwakes in Orkney as well as Shetland experienced breeding failure in 2004 (and to an extent in 2003) suggests that the Orkney stock itself was unusually low, or at least unavailable to surface feeders such as kittiwakes.

In **north Scotland**, breeding success also reached a new all-time low at North Sutor, the only colony in this region to be monitored: no chicks fledged from the small sample of 47 nests monitored. In contrast, breeding success in **north-east Scotland** was considerably higher than in other regions bordering the North Sea, averaging 0.61 chicks per AON, only a little below the 1986-2003 regional average of 0.65. However, breeding success at Sands of Forvie was half that at the other two monitored colonies (Bullers of Buchan and Fowlsheugh), with just 0.35 chicks fledged per AON.

The mean breeding success of **south-east Scotland** was very low in 2004, at 0.37 chicks per AON – the third lowest in the 19 years of the SMP –in contrast to the moderately successful season in 2003. Colonies on the Isle of May and at St Abb's Head were particularly unproductive, both averaging just 0.27 chicks per AON, while the Dunbar colony was twice as successful. On the Isle of May breeding was extremely late, chick growth was slow and pre-fledging mortality was high, together suggesting a severe food shortage. There was also evidence on the Isle of May of high post-fledging mortality and hence, the 2004 cohort will be smaller than indicated by breeding success alone (Harris *et al.* 2004).

The regional mean breeding success of black-legged kittiwakes across colonies in **north-east England** was 0.47 chicks per AON, nearly half that of 2003 and the lowest (just – in 1998 it was 0.48) in the 19 years of the SMP. There was, however, great variation within the region: birds on Coquet Island were successful, though less so than the record high of 2003, as were those nesting on man-made structures at Gateshead (which may have been overestimated, due to a late season). In contrast, the colony at Bempton had its least successful season in recent history, with just 0.17 chicks per AON, as did the Farnes, where many nests were destroyed by storms in June and where food shortages reduced the success of those nests that survived. The colony at Saltburn also did very poorly in 2004. The single colony monitored in **east England** - at Lowestoft – recorded its second least productive year since the SMP began, at 0.70 chicks per AON, 44% down on 2003.

In contrast to North Sea colonies, breeding success of kittiwakes on Ailsa Craig (**south-west Scotland**) increased compared with 2003, to 0.65 chicks per AON- the highest since 2000 and above the long term mean. The mean regional breeding success for **north-west Scotland** remained moderately high (0.76 chicks per AON) though the dwindling sample of birds on St Kilda did characteristically poorly, raising just 0.37 chicks per AON.

At Durlston Head to St Albans Head (**south-west England**) breeding success was above average. At Contrary Head-Trai Cronkan (**Isle of Man**) no chicks fledged from the 30 nests studies (it was last monitored in 1996).

The mean breeding success of colonies in **Wales** in 2004 was very low, at 0.41 chicks per AON. There was a fair degree of variation between colonies, however: Bardsey, Skomer and Great Ormes Head raised between 0.47 and 0.60 chicks per AON but the small sample of nests at Elegug Stacks produced just 0.07 per AON. However, the Bardsey colony from 1998-2003 recorded productivity of not below 1 chick per AON, so the decrease between 2003 and 2004 was notable. On Skomer it was suggested that low breeding success was a result of poor condition of parent birds at the onset of breeding rather than due to poor food supply during chick rearing (Brown and Morgan 2004).

In **north-east Ireland** the colony on the Isle of Muck was relatively unproductive (0.64 chicks per AON) and just over half that recorded in 2003. On Rathlin Island, productivity in 2004 was two thirds of the level in 2003. Black-legged kittiwake colonies in **south-east Ireland** were on average less successful still, at 0.49 chicks per AON, but with marked variation between colonies: Rockabill birds raised 0.94 chicks per AON, while those at Ram Head raised just 0.15. In **north-west Ireland**, Downpatrick Head was rather productive, at $\leq$1.09 chicks per AON.

Table 3.17.4 Breeding success of black-legged kittiwake (fledglings/AON) 2003-2004 and 1986-2003 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 were derived.

Region/site	2003	2004	1986-2003	
			Mean (±s.e.)	No. of years
SW Scotland				
Ailsa Craig	0.43 (169)	0.65 (141)	0.48 (0.08)	17
NW Scotland				
Handa	0.88 (681)	1.11 (708)	1.28 (0.06)	17
Canna	1.00 (356)	0.80 (331)	0.68 (0.06)	18
St Kilda	0.31 (193)	0.37 (188)	0.44 (0.06)	17
Shetland				
Noness	0.00 (38)	0.00 (39)	0.37 (0.16)	8
Hermaness	0.04 (141)	0.14 (128)	0.40 (0.09)	15
Foula	0.00 (101)	0.00 (109)	0.61 (0.10)	17
Noss	0.01 (310)	0.02 (340)	0.26 (0.06)	18
Ramna Geo	0.11 (77)	0.35 (74)	0.48 (0.12)	11
Sumburgh Head	0.00 (113)	0.01 (105)	0.48 (0.12)	18
Fair Isle	0.00 (464)	0.00 (275)	0.71 (0.12)	18
Orkney				
Mull Head	0.72 (136)	0.00 (122)	1.09 (0.04)	18
Papa Westray	0.04 (126)	0.00 (94)	0.79 (0.11)	15
Rousay	0.36 (160)	0.04 (67)	0.83 (0.09)	15
Costa Head	0.40 (244)	0.00 (193)	1.07 (0.08)	11
Gultak	0.70 (112)	0.00 (97)	0.87 (0.05)	18
Marwick Head	0.68 (200)	0.00 (157)	1.08 (0.04)	18
Row Head	0.49 (218)	0.00 (204)	1.04 (0.05)	18
N Scotland				
North Sutor	0.18 (111)	0.00 (47)	0.68 (0.08)	14
NE Scotland				
Bullers of Buchan	0.73 (193)	0.71 (320)	0.56 (0.10)	14
Sands of Forvie	1.06 (92)	0.35 (80)	0.45 (0.09)	14
Fowlsheugh	1.04 (411)	0.83 (387)	0.70 (0.09)	16
SE Scotland				
Isle of May	0.77 (423)	0.27 (476)	0.56 (0.09)	18
Dunbar	0.83 (501)	0.57 (586)	0.94 (0.08)	17
St Abb's Head	0.97 (191)	0.27 (160)	0.70 (0.08)	17
NE England				
Coquet Island	1.69 (84)	1.11 (85)	1.10 (0.09)	11
Bempton	0.25(297)	0.17 (313)	0.99 (0.09)	17
Farnes	0.86 (638)	0.10 (551)	0.92 (0.06)	17
Gateshead	0.81 (204)	0.72 (268)	1.10 (0.05)	15

Table 3.17.4 (cont.)

Region/site	2003	2004	1986-2003	
			Mean (±s.e.)	No. of years
NE England (cont.)				
Saltburn	0.80 (182)	0.26 (130)	0.85 (0.07)	18
E England				
Lowestoft	1.26 (96)	0.70 (115)	1.08 (0.06)	18
SW England				
Durlston Hd – St Albans Hd	0.71 (50)	0.74 (51)	0.69 (0.09)	13
Wales				
Bardsey	1.12 (290)	0.60 (358)	0.74 (0.11)	16
Elegug Stacks	0.24 (66)	0.07 (38)	0.31 (0.07)	13
Skomer	0.53 (704)	0.47 (807)	0.68 (0.05)	18
Great Ormes Head	0.54 (298)	≤0.49 (140)	0.54 (0.06)	15
NE Ireland				
Rathlin Island	1.33 (130)	0.88 (177)	0.97 (0.14)	7
Muck	1.20 (85)	0.64 (80)	1.12 (-)	2 [2001, 2003]
SE Ireland				
Rockabill	1.51 (109)	0.94 (155)	1.08 (0.13)	8
Dunmore	0.68 (829)	0.39 (755)	0.67 (0.04)	18
Ram Head	0.58 (350)	0.15 (278)	0.53 (0.07)	11
NW Ireland				
Downpatrick Head	1.01 (1,073)	≤1.09 (895)	0.87 (-)	2 [2002, 2003]

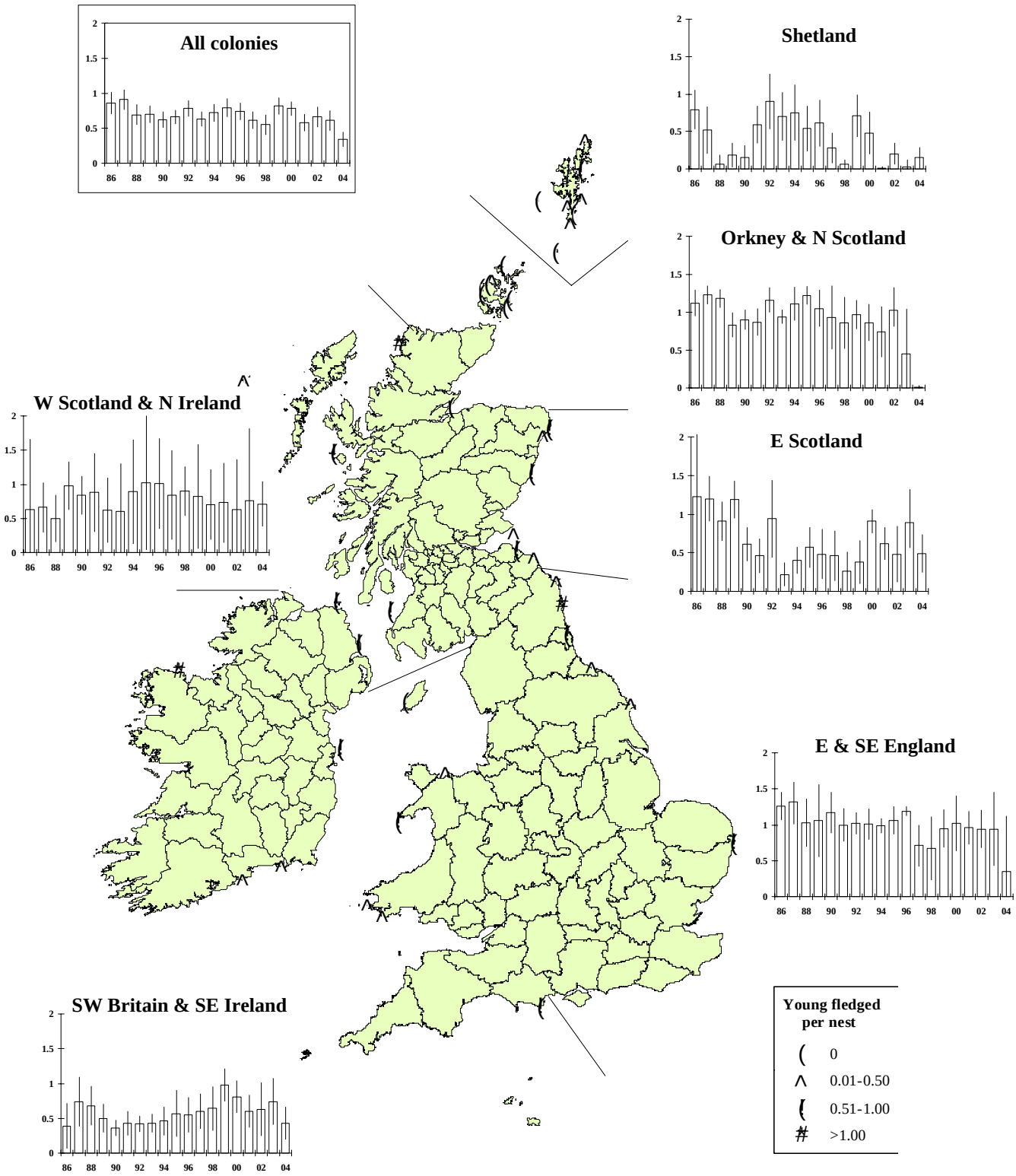

Figure 3.17.2 Breeding performance (chicks fledged per well-built nest) at black-legged kittiwake colonies during 1986-2004, showing regional and annual variation. Symbols on map represent 2004 data for individual colonies; histograms show annual averages (with 95% confidence limits) for the regions indicated. A histogram for SW and NW Ireland where only one colony was monitored in 2002-2004 has been omitted.

3.18 Sandwich tern *Sterna sandvicensis*

The total number of Sandwich terns breeding in sampled colonies in Britain and Ireland in 2004 was similar to 2003. However, numbers continued to decrease in NE and E England but were compensated by increases in most other areas. Inclement weather generally depressed productivity, particularly at the large colonies in eastern England.

Breeding numbers (Tables 3.18.1 and 3.18.2)

At Loch Ryan, **south-west Scotland,** up to 45 pairs were present during a single visit in late May. It is unknown, how many of these actually nested (P. Collin, pers. comm.).

In **Orkney**, Sandwich terns nested at Tuquoy, Westray, but no counts were made (Meek 2004).

A decrease was recorded at the Sands of Forvie, **north-east Scotland**, but numbers remained above the 17-year mean (525 pairs, s.d. ±453). Numbers at the Isle of May, **south-east Scotland**, almost trebled to 151 from 2003, continuing the widely fluctuating trend at this site (Bradbury and Alampo 2004).

Table 3.18.1 Regional population changes (breeding pairs) at monitored Sandwich tern colonies, 2003-2004. 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	2003	2004	2003-2004 % change
SW Scotland	26	<45	+73.1[1]
NE Scotland	1,008	833	-17.4[2]
SE Scotland	58	151	+160.3[2]
NE England	3,237	3,011	-7.0[3]
E England	3,815	3,080	-19.3[4]
SE England	829	1222	+47.4[6]
SW England	195	212	+8.7[2]
NW England	350	420	+20.0[1]
Wales	1,227	1,563	+27. 4[1]
NE Ireland	2,235	2,345	+4.5[3]
NW Ireland	363	564	+55.4[3]
SE Ireland	1,252	1,161	-7.3[1]
Britain and Ireland	14,595	14,607	+0.1[29]

In **north-east England,** the two large colonies at Coquet and the Farne Islands each declined by around 7%, resulting in the region's lowest level since 1976.

The total number in **east England** declined by almost 20%, reaching its lowest level since 1989 and falling below the 18-year mean (3,778, s.d.±543). Although numbers at Scolt Head almost trebled from 2003, a larger decrease occurred at Blakeney, with additional declines at Holkham and Havergate.

In contrast, in **south-east England,** overall numbers increased by almost 50%. This is largely attributable to the almost two-fold increase at Burntwick Island and the return of this species to North Solent. Additionally, numbers at Rye Harbour and Langstone Harbour reached their highest level on record. In contrast, the colony at Pitt's Deep declined by over 90%.

Table 3.18.2 Population changes of Sandwich tern breeding pairs 2003-2004 and 1986-2003 at selected sites referred to in the text in Britain and Ireland. (- indicates that no data were available, + indicates birds were present but no quantitative data available).

Region/Site	2003	2004	2003-2004 % change	1986-2003 Mean (±s.d.)	1986-2003 No. years
SW Scotland					
Loch Ryan	26	45	+73.1	32 (37)	16
NE Scotland					
Sands of Forvie	1,008	833	-17.4	526 (453)	17
SE Scotland					
Isle of May	58	151	+160.3	162 (199)	6
NE England					
Coquet	1,238	1,158	-6.5	1,538 (279)	18
Farne Islands	1,999	1,853	-7.3	2,411 (586)	18
E England					
Scolt Head	650	1,800	+176.9	1,619 (1371)	18
Holkham	250	18	-92.8	424 (326)	3
Blakeney	2,900	1,260	-56.6	2,007 (1275)	18
Havergate	15	2	-86.7	82 (91)	18
SE England					
Burntwick Island	315	602	+91.1	212 (131)	5
Rye Harbour	*c.*250	300	+20.0	59 (72)	18
Chichester Harbour	0	0	0	11 (14)	18
Langstone Harbour	144	172	+19.4	40 (52)	18
North Solent NR	0	*c.*140	+100.0	178 (74)	18
Pitts Deep - Hurst	120	*c.*8	-93.3	59 (55)	14
SW England					
Brownsea	194	211	+8.8	95 (56)	18
Wales					
Anglesey	1,227	1,563	+27.4	626 (233)	18
NW England					
Hodbarrow	350	420	+20.0	262 (156)	15
NW Ireland					
Lower Lough Erne	78	105	+34.6	51 (22)	18
Lough Swilly	110	242	+120.0	163 (72)	18
Mulroy Bay	175	217	+24.0	73 (79)	18
NE Ireland					
Green Is., Carlingford	387	795	+105.4	459 (357)	18
Larne Lough	443	573	+29.3	226(145)	18
Strangford Lough	1,405	977	-30.5	993 (538)	18
SE Ireland					
Lady's Island Lake	1,252	1,161	-7.3	1,078 (302)	18

Numbers on Brownsea, **south-west England**, continued to increase and reached more than twice the 18-year mean of 95 pairs (s.d. ± 56). As in 2003, one pair nested on the Isles of Scilly.

The colony on Anglesey, **Wales,** recovered from its low in 2001 of 349 pairs, reaching record high levels at 1,563 pairs (cf. 782 in 2002 and 1,227 in 2003).

Numbers at Hodbarrow, **north-west England,** reached 420 pairs, their second highest total since the colonisation of this site in 1989.

The total number breeding in **north-east Ireland** increased by 5% compared to 2003: similar to that between 2002 and 2003. There were large increases at Larne Lough and Green Island, Carlingford, but the number at Strangford Lough declined by 30%. All three monitored colonies in **north-west Ireland** increased substantially in size, resulting in the region's

highest total for 19 years. A decline from 2003 was observed at Lady's Island Lake in **south-east Ireland**, but numbers remained above the 1986-2003 mean of 1,078 pairs (s.d. ± 302).

Breeding success (Tables 3.18.3 and 3.18.4)

Mean productivity across monitored colonies in 2004 was 0.52 chicks per pair (s.e.±0.03, n=17), the lowest value for 12 years.

Breeding success was not monitored at Loch Ryan, **south-west Scotland**, in 2004. Twenty fledged chicks were reported from an unknown number of breeding pairs on Tuquoy, Westray in **Orkney** (Meek 2004). Productivity at the Sands of Forvie, **north-east Scotland**, was difficult to assess due to rapid departures of juveniles soon after fledging. Therefore, the peak fledging count was only 210. However, the proportion of fledged ringed to unringed chicks suggests a productivity of at least 0.84 chicks per pair (Drysdale 2004). On the Isle of May, **south-east Scotland**, Sandwich terns arrived much later than in 2003 and raised a maximum of 5 chicks.

Breeding success in **north-east England** was severely affected by storms in June. Around 1,000 dead Sandwich tern chicks were recovered at the Farne Islands the day after the storm. Those few chicks that did survive the storms later suffered from a shortage of sandeels and virtually no chicks were fledged from the islands in 2004 (Steel 2004). Storm damage was less severe at Coquet, but combined effects of this and of an obvious food shortage nevertheless resulted in a low productivity of just 0.24 chicks fledged per pair, less than half the 12-year mean (0.65, s.e. ± 0.06).

Table 3.18.3 Sandwich tern productivity, 2003–2004, 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). (- indicates no data were available).

Region	2003 chicks fledged/pair			2004 chicks fledged/pair		
	Pairs[n]	Range	Overall	Pairs[n]	Range	Overall
SW Scotland	26[1]		>1.0	-		-
NE Scotland	1,008[1]		*c*.0.71	833[1]		0.25-0.84
SE Scotland	58[1]		0.31	151[1]		0.03
NE England	1,238[1]		0.40	1,158[1]		0.24
E England	3,815[4]	0.20-1.00	0.80	3,080[4]	0.00-1.50	0.30
SE England	394[2]	0.40-1.20	*c*.0.91	620[4]	0.00-1.33	*c*.0.79
SW England	195[2]	0.00-0.90	0.90	212[2]	0.00-0.86	0.85
Wales	1,227[1]		1.20	1,563[1]		1.02
NW England	350[1]		1.00	420[1]		0.71
NW Ireland	285[2]	0.12-0.91	<0.62	459[2]	0.86-1.09	<0.99
Total	8,596[16]	0.00-1.20	***c*.0.79**	8,496[17]	0.00-1.50	***c*.0.52**

Similarly, in **east England** overall productivity was, together with that of 1991, the lowest for 19 years. The bad weather affected all sites in Norfolk with, additionally, poor feeding reported from Blakeney. The two pairs at Havergate, Suffolk, reared three young.

Colonies in **south-east England** were generally more successful. Overall productivity was around 0.79 chicks per pair - above that of 2001 and 2002, but slightly below the average of

the two sites monitored in 2003. Whilst there was no indication of a food shortage in this region, colonies at Langstone Harbour and Pitt's Deep - Hurst were severely affected by storms. However, productivity reached the 7-year mean at Langstone Harbour. Predation by fox resulted in a breeding failure at North Solent. In contrast, for a third consecutive year, Sandwich terns at Rye Harbour had a very productive breeding season and fledged 400 young.

In **south-west England**, productivity on Brownsea Island was similar to that in 2003, resulting in another record number of fledged chicks for this site. Food was plentiful and consisted almost exclusively of sandeels, but poor weather and predation accounted for some losses (C. Williams, pers. comm.).

Productivity at the colony on Anglesey, **Wales**, was below that of 2003, but above the 13-year mean of 0.84 chicks per pair (s.e. ± 0.08).

The colony at Hodbarrow, **north-west England**, was less productive than in 2003, at 0.71 chicks per pair.

All sites in **north-west Ireland** reported a moderate to good breeding season during 2004. A minimum of 32 fledged chicks was reported from Lower Lough Erne, but the true figure was thought to be much higher (B. Robson, pers. comm.). At Lough Swilly and Mulroy Bay, 265 and 188 large chicks, respectively, were ringed and were thought to have fledged (Perry and Speer 2004). No productivity figures were available from the colonies in **north-east Ireland**, but at Lady's Island Lake, **south-east Ireland**, a small sample of nests gave a productivity value of 1.21, indicating a more productive season than in 2003 (S. Newton, pers. comm.).

Table 3.18.4. Productivity of Sandwich terns expressed as chicks per pair 2003–2004 and 1986-2003 at selected sites referred to in the text. (- indicates no data available).

Region/site	2003	2004	1986-2003	
			mean (±s.e.)	No. of years
SW Scotland				
Loch Ryan	>1.0	-	-	-
NE Scotland				
Sands of Forvie	*c.*0.71	>0.25	0.61 (0.47)	14
NE England				
Coquet	0.4	0.27	0.65 (0.06)	12
E England				
Scolt Head	0.77	0.35	0.71 (0.12)	12
Holkham	1.0	0	0.98 (0.04)	3
Blakeney	0.79	0.24	0.73 (0.08)	14
Havergate	0.20	1.5	0.68 (0.14)	13
SE England				
Rye Harbour	*c.*1.20	1.33	0.44 (0.15)	13
Langstone Harbour	0.39	0.52	0.50 (0.13)	7
Pitts Deep - Hurst	+	0	-	-
SW England				
Brownsea	0.90	0.86	0.67 (0.10)	13
Wales				
Anglesey	1.20	1.02	0.84 (0.08)	13
NW England				
Hodbarrow	1.00	0.71	0.45 (0.13)	14
NW Ireland				
Lower Lough Erne	>0.62	-	0.36 (0.07)	9
SE Ireland				
Lady's Island Lake	*c.*0.78	1.21	0.70 (0.12)	5

3.19 Roseate tern *Sterna dougallii*

The total number of roseate terns breeding in Britain and Ireland increased slightly between 2003 and 2004 to c.843 pairs, the highest number for 25 years. However, they are confined to just three large colonies and four small colonies, two of which decreased in size compared to 2003. For the first time in at least 35 years, no roseate terns nested at their once traditional strong-hold in Wales. Overall productivity was high at 1.40 fledged chicks per pair but slightly lower than in 2003.

Breeding numbers (Table 3.19.1)

In 2004, 843 pairs of roseate terns bred in Britain and Ireland, the most since 1979, having increased by 3% from 2003. Of these, 80% bred on Rockabill, **south-east Ireland**, where 677 pairs was the highest on record. In the same region, Ireland's second largest colony, at Lady's Island Lake, declined for a second year, while the number breeding at colony C, a site newly colonised in 2003, more than doubled in 2004 to around 12 pairs. At Ireland's only other colony, at Larne Loch Islands, **north-east Ireland,** eight pairs nested, equivalent to the 10-year average but below the 19 pairs in 2003. The total number of roseate terns breeding in Ireland increased from 739 pairs in 2003, to 763 pairs in 2004.

Table 3.19.1 Roseate tern numbers (breeding pairs) at most colonies in Britain and Ireland 1993–2004. (- indicates that no data were available).

Region/ Site	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2003-2004 % change
E Scotland													
Inchmickery	0	2	0	0	0	0	0	0	0	0	0	0	
Forth B	17	7	11	7	8	8	9	10-11	1	2	8	4	-50.0
Forth C	-	-	1	1	0	0	0	1	1	0	0	0	
New colony	0	0	0	0	0	0	0	1	0	0	0	0	
NE England													
Farne Islands	3	2-3	2	2	3	3	4	1	1	1	0	0	
Coquet Island	*c*30	*c*38	38	24	25	29	34	34	42	57	70	73	+4.3
New colony A	0	0	1	14	2	3	0	0	0	0	0	0	
New colony B	0	0	0	0	0	0	0	0	0	1	0	0	
Wales													
Anglesey A	16	18	10	1	2	3	3	2	7	7	0	0	
Anglesey B	0	0	0	0	1	0	0	0	0	0	0	0	
Anglesey C	5	2	0	0	0	2-3	0	0	0	0	2	0	
NE Ireland													
Larne Lough	0	4	7	13	7	3	10	4	6	4	19	8	-57.9
Carlingford L.	0	0	0	0	2	0	0	0	0	0	0	0	
SE Ireland													
Rockabill	427	394	554	557	602	578	611	618	605	588	638	677	+6.1
Lady's Island	76	140	60	120	48	80	116	>78	46	96	77	66	-14.3
Colony C	0	0	0	0	0	0	0	0	0	0	5	12	+140.0
Total*	578	614	686	744	703	712	788	>750	709	758	821	843	+2.7

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

The total number breeding remained stable: 80 pairs nested in 2004 compared to 82 in 2003. Of these, 73 pairs nested on Coquet, **north-east England,** the most to have bred on the island since 1972, following four consecutive years of increase. Elsewhere, just 4 pairs nested at the only remaining site in **east Scotland** and three pairs were recorded in **south-east England**. For the first time since recording began in 1969, no roseate terns nested in **Wales**. There were records of three birds present during the breeding season at a second site in Scotland and up to 5 birds present on the Farne Islands, north-east England but no breeding was attempted at either site.

Breeding success (Table 3.19.2)

The overall productivity at monitored sites was 1.40 chicks fledged per pair and despite being slightly below that of 2003, was for the sixth consecutive year, above the 10-year mean of 1.27 fledged chicks per pair (s.e. = 0.06).

Breeding success on Rockabill, the largest colony, was high at 1.48 chicks per pair, although slightly lower than in 2003. Body mass of chicks over the period of 0-4 days after hatching was considerably higher than that in 2003, indicating good foraging conditions and high quality prey availability in the early part of the season (Hall *et al.* 2004). Elsewhere in **south-east Ireland,** at Lady's Island Lake productivity was 1.24 fledged chicks per pair: the second highest for there since 1990; and more than 15 chicks fledged from colony C. Six chicks were raised to near fledging at Larne Lough Island, **north-east Ireland**, resulting in a maximum productivity of 0.75 chicks per pair, although the final outcome was unknown.

On Coquet (**north-east England)**, Britain's largest colony, a prolonged wet and windy period in late June combined with a food shortage resulted in the lowest productivity since 1997. However, productivity of this species was considerably higher than that of other tern species at this site, largely attributable to the nest boxes that are used exclusively by the roseate terns and which provided shelter from the bad weather (Lowe *et al.* 2004). The inclement weather in June also resulted in breeding failure of the two pairs in **south-east England**. Five young fledged from four pairs at Forth B in **south-east Scotland**,

Table 3.19.2 Productivity of roseate terns 2003–2004; no of chicks per breeding pair.

		2003		2004
Region/Site	**Pairs**	**fledged/pair**	**Pairs**	**fledged/pair**
E Scotland				
Forth B	8	1.11	4	1.25
NE England				
Coquet	70	1.13	73	0.86
SE England				
Colony A	2	0.00	2	0.00
NE Ireland				
Larne Lough	19	0.37	8	<0.75
SE Ireland				
Rockabill	638	1.58	677	1.48
Lady's Island Lake	77	1.53	66	1.24
Colony C	5	*c.*1.6	*c.*12	*c.*1.25
Total	**818**	**1.50**	**842**	**1.40**

3.20 Common tern *Sterna hirundo*

The total number of common terns breeding at monitored colonies declined marginally between 2003 and 2004. Decreases in SE Scotland, E England and NE Ireland were largely compensated by increases in W Scotland, NE England and SE Ireland. Poor weather and food shortages depressed productivity in most regions, although in W Scotland and SE Ireland, common terns were very productive.

Breeding numbers (Tables 3.20.1 and 3.20.2)

The number of common terns breeding at monitored colonies in **north-west** and **south-west Scotland** increased by over 15% from 2003. This was largely attributable to the eightfold increase at Glas Eileanan, Sound of Mull, where numbers reached their highest level since recording began in 1986. This increase, however, was partly offset by the absence of common terns from Eileanan Glasa, Sound of Mull, and Sgeir nan Caillich, Loch Melfort, which each held 200 pairs in 2003.

Similar to 2003, at least 12 pairs were reported from six sites in **Shetland**. Overall, numbers in **north Scotland** continued to decline, although there was much intra-regional variation. Numbers at the Avoch Fish farm continued to increase by over 30% to their highest level since monitoring began in 2000, but numbers halved at Alness Point to only 15 pairs, the site's second lowest total since 1989. At Nigg, the number fell to its lowest level since 1989. Although the colony at Barmac's increased by 20 pairs, this was below the long-term mean for the site of 147 pairs. At Arduillie, a site first colonised by 28 pairs in 2003, only 18 pairs nested in 2004, a decline of over 35%.

There was little overall change in **north-east Scotland**. However, the number at St Fergus declined markedly, to only 16% of that in 2003, the second lowest total since 1988. This decline was largely compensated by substantial increases at Loch of Strathbeg and Site X. The increase at the latter location is unfortunate, as eggs at this industrial site are being destroyed under licence (P. Gordon, pers. comm.).

In **south-east Scotland,** an overall decline of 18% occurred between 2003 and 2004. At Grangemouth, numbers decreased by 24%, to 2002 levels. At Leith Docks - the region's largest colony - numbers fell by almost 20%, but remained above the long-term mean of 472 pairs. The number at the Isle of May was similar to that of 2003. Only Long Craig reported a considerable increase, of 36%, to its highest level since the SMP began in 1986. However, it is thought that this increase was attributable to birds relocating from Rosyth (M. Oksien, pers. comm.), where common terns nested in 2003 but were absent in 2004.

Numbers in **north-east England** increased after the decline in 2003, although the site at Teesmouth, the region's second-largest colony, had been almost destroyed. However, the increase in a corresponding number of breeding pairs at North Tees Marsh suggests that birds have relocated to this recently created site. Following the decline on the Farne Islands in 2003 to the lowest level since 1975, numbers increased by 75% in 2004. On Coquet, 162 more pairs were recorded than in 2003, reaching the highest level since 1982.

In **central England** numbers at Rye Meads, Hertfordshire, declined by eight pairs but remained just above the long-term mean of 43 pairs.

Table 3.20.1 Regional population changes at monitored common tern colonies, 2003–2004 (breeding pairs). Superscript = number of colonies counted in both years. Regional samples <100 pairs not included.

Region	2003	2004	2003-2004 % change
SW and NW Scotland	1,200	1,390	$+15.8^{47}$
N Scotland	400	334	-16.5^{9}
NE Scotland	479	466	-2.7^{5}
SE Scotland	1,201	983	-18.2^{8}
NE England	1,299	1,537	$+18.3^{11}$
E England	1,071	827	-22.8^{12}
SE England	624	680	$+9.0^{10}$
SW England	323	383	$+18.6^{3}$
Wales	983	970	-1.3^{4}
NW England	226	*c.*203	*c.*-10.2^{4}
NE Ireland	2,042	1,400	-31.4^{5}
SE Ireland	917	1,068	$+16.5^{1}$
Britain and Ireland	10,765	10,241	-4.9^{119}

In **east England**, a large decline was reported, with notable decreases at Scolt Head and Blakeney. However, at Havergate Island, 85 pairs was the highest number to nest there since 1995. Numbers at Breydon Water, one of the largest colonies in the region, remained stable at 194 pairs. Data were received for the first time from Welney, an inland site, where two pairs of common terns first nested in 1998 and numbers have now increased to 45 pairs in 2004 (J. Kemp, pers. comm.).

Overall, a small increase occurred in **south-east-England**. Langstone Harbour reached its highest total since the site was colonised in the late 1970s, although numbers at neighbouring Hayling Oysterbeds halved, to 23 pairs. A similar decline occurred at Dungeness (50 pairs in 2003, 24 in 2004). Numbers at Rye Harbour appeared to have recovered from the decline between 1998 and 2002, increasing by 22% from 2003. For the first time in three years, common terns (60 pairs) nested at North Solent NNR, although numbers were below the long-term mean of 161 pairs (s.d.±106). No systematic count data were collected for the Medway Estuary, but it was thought that the area held around 350-400 pairs of common terns in 2004 (M. Ellison, pers. comm.). Elsewhere in the region, numbers at the Isle of Wight (6 pairs) and Cliffe Pools (43 pairs) remained stable.

The few colonies in **south-west England** also increased in size, although these were small the Isles of Scilly (*c.*90 pairs in 2004 cf. 83 pairs in 2003). Lodmoor, however, reached its highest total since monitoring began at the site in 1998 and numbers at Brownsea Island increased further to a second year of record high levels.

There was little change in the total number breeding in **Wales**, although a continued increase at the largest colony at Shotton was offset by decreases of 17% and 29% at two other Welsh sites.

Overall, an apparent decline of around 10% occurred in **north-west England**, although numbers were difficult to assess at Seaforth, the region's largest colony. The best estimate for this site was 161 pairs, similar to that in 2003. There was no change in the number of pairs nesting at Hodbarrow (30 pairs), whilst only 12 nests were counted at Rockcliffe Marsh, compared to 23 in 2003. Five pairs attempted to breed at Old Moor, whilst two birds were seen prospecting at Foulney.

Table 3.20.2 Population changes of common terns 2003–2004 and 1986-2003 at selected sites referred to in the text. Figures refer to number of pairs.

Region/Site	2003	2004	2003-2004 % change	1986-2003 Mean (±s.d.)	1986-2003 No. years
SW Scotland					
Sgeir na Caillich	200	0	-100.0	191 (116)	14
G.Eileanan, Sd Mull	117	950	+711.9	525 (224)	18
N Scotland					
Alness Point	30	15	-50.0	115 (73)	16
Avoch	120	160	+33.3	80 (27)	4
Barmac	80	100	+25.0	147 (144)	15
Nigg	126	33	-73.8	168 (106)	15
NE Scotland					
'Site X'	*c.*200	300	+50.0	70 (73)	7
Loch of Strathbeg	64	98	+53.1	90 (36)	17
St Fergus	190	30	-84.2	143 (68)	17
SE Scotland					
Isle of May	60	62	+3.3	154 (113)	18
Leith Docks	795	639	-19.6	472 (176)	15
NE England					
Coquet	923	1085	+17.6	778 (178)	18
Farnes	76	133	+75.0	219 (92)	18
Teesmouth	*c.*92	*c.*8	*c.*-91.3	211 (148)	8
C England					
Rye Meads	52	44	-15.4	43 (5)	13
E England					
Scolt Head	280	150	-46.4	171 (82)	18
Blakeney	168	120	-28.6	204 (65)	18
SE England					
Pitts Deep - Hurst	*c.*200	*c.*225	+12.5	145 (95)	17
Langstone Harbour	146	192	+31.5	72 (47)	18
Chichester Harbour	45	2	-95.6	22 (27)	18
SW England					
Brownsea	207	246	+18.8	150 (37)	18
Lodmoor	33	*c.*47	+42.4	29 (14)	6
Wales					
Shotton Pools	607	656	+8.1	333 (146)	18
Cemlyn	57	72	+26.3	64 (26)	16
NW England					
Seaforth	168	*c.*161	*c.*-4.2	71 (67)	18
NE Ireland					
Larne Lough	636	567	-10.9	329 (43)	16
Carlingford Lough	510	289	-43.3	369 (143)	15
Strangford	894	529	-40.9	594 (112)	18
SE Ireland					
Rockabill	917	1,068	+16.5	378 (261)	18
Lady's Island Lake	+	312	-	307 (96.7)	14
Dublin Port	207	-	-	138 (85)	9

After the record high in **north-east Ireland** in 2003, all the major sites in the region reported declines, the largest of which were at Strangford and Carlingford Lough. At the latter site, numbers reached their lowest level since 1995. Elsewhere in the region, 165 pairs nested at two colonies in Belfast Lough, more than twice the 75 pairs recorded in 2002 (no count data were available for 2003).

Numbers at Rockabill, **south-east Ireland**, continued to increase - to 1,068 pairs. At Lady's Island Lake, 312 pairs were recorded (*c.*461 in 2002).

Breeding success (Tables 3.20.3 and 3.20.4)

Overall productivity was high in **south-west Scotland** and **south-east Ireland** but below average in Wales (1990-2003 mean = 1.18 chicks per pair, s.e.±0.12). Colonies in England were less successful, with an overall productivity of half the long-term mean (1989-2003 mean = 0.82 chicks per pair, s.e ±0.07); the least productive colonies were in east England.

At 10 sites in **north-west** and **south-west Scotland** where mink were successfully removed, productivity was 1.42 chicks per pair, compared with only 0.11 at five sites with no or unsuccessful mink control. The most productive site was Glas Eileanan, Sound of Mull, where almost 1,500 young fledged from 950 pairs, following three unsuccessful breeding seasons. Raptor predation depressed productivity at two sites, whilst most of the 80 pairs at Islet Narrows, Loch Teacuis, abandoned the site after an incident of mink predation (Craik 2004). Small colonies at Gunna (8 pairs), Coll (4) and Tiree (1) all failed.

Four young fledged from 12 pairs in **Shetland**. Overall productivity in **north Scotland** was, at 0.59 chicks per pair, higher than in 2003 and above the long-term mean (0.45 chicks per pair, s.e.±0.08). However, for a third consecutive year complete breeding failure occurred at Barmac's, Nigg and Alness Point. The small colony at Mid-Fearn Mere proved to be productive, with six chicks fledging from nine pairs, and productivity at Avoch Fish Farm was as high as in 2003.

Colonies in **north-east Scotland** were less productive than in 2003. At Loch of Strathbeg, productivity was, with 0.33 chicks per pair, above the long-term mean of 0.27 (s.e.±0.05), whilst at the Sands of Forvie, avian predation and a food shortage resulted in only one chick fledging from 19 pairs (Drysdale 2004). The two pairs at River Dee failed due to bad weather, whilst two chicks fledged from two nests on a warehouse roof in Westhill. Productivity for 19 pairs at Loch Spynie was at least 0.21 chicks per pair, less than a third of that in 2003.

The only data available from **south-east Scotland** was a productivity of 0.1 chicks per common/Arctic tern pair on the Isle of May. It is believed that the low breeding success was caused largely by the scarcity of their preferred prey (Bradbury and Alampo 2004). On Long Craig, 54 chicks were ringed (M. Oksien, pers. comm.).

Productivity in **north-east England** was the lowest for this region since 1991. Note that this is almost entirely based on data from Coquet, where storms in June and a subsequent food shortage depressed productivity. The bad weather also affected breeding at the Farne Islands, although no quantitative data were available. Elsewhere in the region, nine chicks fledged from 12 pairs at Whisby Pits and from *c.* six pairs at Boultham Mere.

Productivity was high at Rye Meads, the only site in **central England** from which data was available, at 1.41 fledged chicks per pair.

The 2004 season was the least productive in **east England** since the start of the SMP in 1986. Severe weather and a food shortage resulted in an almost complete breeding failure of all monitored colonies on the north Norfolk coast. Colonies in Suffolk and those at inland sites were generally more productive. A suspected food shortage at Breydon Water resulted in its lowest productivity, of 0.51 chicks per pair, since 1990 (11-year-mean 1.07 chicks per pair, s.e.±0.06) (M. Smart, pers. comm.). Predation by mink at Alton Water resulted in only four fledged young from *c.*35 pairs, whilst 17 pairs on a raft at Trimley Marshes fledged at least 30 chicks (M. Wright, pers. comm.). Productivity at Welney and Hoveton Broad was moderate at 0.78 and 0.87 chicks per pair, respectively. Fledged young were present at Minsmere and Havergate, but no quantitative data were available.

Overall productivity in **south-east England** was below average in 2004. Rye Harbour experienced its most productive season for six years, but the colony at Pitt's Deep was wiped out by gales in late June. After a promising start to the breeding season with food being plentiful, storms caused failures at the egg and chick stage at Langstone Harbour and nearby Hayling Oysterbeds, resulting in a low productivity of 0.19 chicks per pair (C. Cockburn, pers. comm.). Similarly, tidal inundation destroyed the two common tern nests at Chichester (A. de Potier, pers. comm.), whilst fox predation was most likely responsible for the low productivity at North Solent NNR (B. Lord, pers. comm.). However, the six pairs on the Isle of Wight, fledged six young.

In **south-west England**, the storms in June affected all colonies to some extent, but more so on the Isles of Scilly, where productivity was 0.57 chicks per pair, although predation was low compared with 2003 (B. Lascelles, pers. comm.). Bad weather combined with predation (presumed to be mainly by rats) resulted in lower than average productivity at Brownsea Island (C. Williams, pers. comm.). Productivity at Lodmoor was below average, although it was higher than in 2003.

Table 3.20.3 Common tern productivity, grouped regionally, 2003–2004: 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). (- indicates no data were available).

Region	2003 chicks fledged/pair			2004 chicks fledged/pair		
	Pairs^{n}	Range	Overall	Pairs^{n}	Range	Overall
SW Scotland	959^{14}	0.00-2.22	0.54	1,153^{10}	0.00-1.53	1.39
NW Scotland	193^{8}	0.00-1.02	0.68	192^{8}	0.00-1.76	0.63
N Scotland	405^{8}	0.00-1.11	0.40	316^{5}	0.00-1.13	0.59
NE Scotland	25^{2}	0.09-0.71	0.44	140^{5}	0.00-1.00	0.28
SE Scotland	266^{3}	0.41-133	0.84	-	-	-
Total Scotland	1,848^{35}	0.00-2.22	**0.56**	1,801^{28}	0.00-1.76	**1.08**
NE England	971^{4}	0.12-1.04	1.00	1,103^{3}	0.57-1.50	0.58
C England	56^{3}	1.38-2.00	1.41	44^{1}		1.41
E England	1,063^{11}	0.00-1.61	0.77	701^{9}	0.00-1.76	0.27
SE England	374^{7}	0.00-1.40	0.58	613^{7}	0.00-1.67	0.41
SW England	323^{3}	0.34-1.06	0.76	383^{3}	0.49-1.36	0.61
NW England	228^{5}	0.04-2.00	0.61	208^{4}	0.00-0.50	0.22
Total England	3,015^{33}	0.00-2.00	**0.82**	3,052^{27}	0.00-2.00	**0.47**
Wales	983^{4}	0.99-2.04	**1.26**	898^{3}	0.60-0.99	**0.91**
NE Ireland	-		-	-		-
SE Ireland	917^{1}		1.17	1068^{1}		1.71

Table 3.20.4 Productivity of common terns expressed as chicks per pair 2003–2004 and 1986-2003 at selected sites referred to in the text. (- indicates no data available)

Region/site	2003	2004	1986-2003 Mean (±s.e.)	No. of years
SW Scotland				
E an Ruisg, L Feochan	1.67	0.56	2.19 (0. 22)	6
Sgeir nan Caillich, L Melfort	0.00	N/a	0.65 (0.31)	6
G. Eileanan, Sd Mull	0.00	1.53	0.30 (0.15)	5
N Scotland				
Avoch Fish Farm	1.11	1.13	0.70 (0.34)	4
Nigg	0.00	0.00	0.54 (0.15)	14
NE Scotland				
St Fergus	>0.41	>0.23	0.16 (0.06)	10
SE Scotland				
Grangemouth	*c.*0.41	-	0.44 (0.06)	8
NE England				
Coquet	1.04	0.57	1.08 (0.15)	18
C England				
Rye Meads	1.38	1.41	1.53 (0.16)	8
E England				
Hoveton Great Broad	1.58	0.87	1.37 (0.17	3
Snettisham	0.02	0.00	0.33 (0.11)	12
Holkham	0.00	0.00	0.47 (0.14)	13
Blakeney	0.27	0.02	0.51 (0.14)	12
SE England				
Pitts Deep – Hurst	-	0.00	0.41 (0.12)	8
Langstone Harbour	0.23	0.19	0.58 (0.14)	16
Hayling Island	0.38	0.09	0.34 (0.05)	2
SW England				
Brownsea Is	0.85	0.49	0.63 (0.08)	15
Lodmoor	*c.*1.06	*c.*1.36	1.57 (0.22)	6
Wales				
Shotton	0.99	0.99	1.31 (0.14)	15
Cemlyn	2.04	+	0.59 (0.24)	9
NW England				
Seaforth	0.77	0.19	0.64 (0.07)	18
Rockcliffe	0.04	0.00	0.13 (0.06)	11
NE Ireland				
Belfast Lough	+	>1.21	1.51 (0.16)	3
SE Ireland				
Rockabill	1.17	1.71	1.60 (0.14)	13
Dublin Port	-	-	1.48 (0.10)	5

Inclement weather resulted in high mortality of chicks at Shotton, **Wales**, but birds relaid with much better success, resulting in moderate (for the site) productivity of 0.99 chicks per pair (P. Triggs, pers. comm.). Although there were no quantitative data available for fledged young, there were indications that other Welsh sites experienced a moderate to good breeding season.

Productivity in **north-west England** was 0.21 chicks per pair; considerably lower than that of 2003. This was largely due to the low number of fledged young at Seaforth, where 132 chicks hatched but a shortage of appropriately sized sandeels led to many of them starving.

In addition, gales overtopped the nesting rafts in June, killing most of the remaining chicks. Many birds relaid, but although the weather improved, food availability did not, resulting in a low overall productivity (S. White, pers. comm.). No young fledged from Rockcliffe Marsh or from Old Moor, but at 15 fledged young, productivity at Hodbarrow was much improved compared with previous years (two in 2003, none in 2002 and 2001).

No productivity figures were available from the large colonies in **north-east Ireland**, but more than 200 chicks fledged from 165 pairs at Belfast Lough, indicating a successful breeding season. Productivity on Rockabill, **south-east Ireland**, was 1.71 chicks per pair (n=141), above the long-term average, but some post-fledging mortality occurred due to predation by peregrine falcon (Hall *et al.* 2004). No other productivity data were available from this region.

3.21 Arctic tern *Sterna paradisaea*

The were large declines in the number of Arctic terns at monitored colonies in Shetland and Orkney between 2003 and 2004, but numbers increased in most other regions. The continuing lack of sandeels in the North Sea resulted in almost complete breeding failures in Orkney, Shetland and NE and SE Scotland. Bad weather and food shortages resulted in low productivity in NE England and W Scotland. Productivity in Wales was only half the long-term average and only in south-east Ireland was productivity greater than in 2003.

Breeding numbers (Tables 3.21.1 and 3.21.2)

Table 3.21.1 Population changes at monitored Arctic tern colonies, 2003–2004 (breeding pairs). Superscript = number of colonies/sites counted in both years. Regional samples <100 pairs not included.

Region	2003	2004	2003-2004 % change
SW and NW Scotland	978	1,391	$+42.2^{27}$
Shetland	877	645	-26.5^{8}
Orkney	3,304	773	-76.6^{5}
N Scotland	223	200	-10.3^{11}
NE Scotland	376	440	$+17.0^{6}$
SE Scotland	581	669	$+15.2^{3}$
NE England	3,836	4,271	$+11.3^{3}$
Wales	2,044	1,979	-3.2^{3}
NE Ireland	1,099	1,478	$+34.5^{5}$
SE Ireland	139	211	$+51.8^{5}$

Dramatic declines in the number of nesting Arctic terns occurred at monitored colonies in **Shetland**; although they were present at most sites early in the season, most did not attempt to nest. This was most notable on Fair Isle, where numbers of birds peaked at around 300 in late May, but only 11 AIA (apparently incubating adults) were recorded, the lowest since 1985, when the colony was establishing itself (Shaw *et al.* 2004). This represents a dramatic decline from a peak count of 2,836 AIA in 2001. Similarly, on Foula none of the 150 birds present nested, compared with 800 only three years previously. Although a similar number to 2003 was present on Mousa, of the 170 individuals counted, only 20 laid (H. Moncrieff, pers. comm.). The number on Fetlar declined to its lowest level since at least 1990. On West Burra, a colony that held 50 birds in early June was deserted within a few days and a colony of around 250 birds on Burra, although looking very active on 17 June, was abandoned three days later (Okill 2004).

Large declines also occurred at colonies in **Orkney**. At North Hill, Papa Westray, a site that held 4,800 pairs of Arctic terns in 1990 and declined to around 638 in 2003, had only *c.*15 pairs in 2004. Around 1,100 adults were located at 12 colonies on Westray, compared with *c.*3,500 in 2003. Similarly, on North Ronaldsay and Auskerry, moderately high numbers appeared at the start of the season but most left without laying. On Rousay, the western maritime heaths that once held large colonies were devoid of Arctic terns in 2004 (Meek 2004). A larger proportion of birds present attempted to breed on islands in the south of Orkney. On Swona, 1,300 adults were present in mid June, but by early July only 450 remained, and many were still incubating. The Golta peninsula on Flotta held two sub-colonies, totalling 600 adults on 2 July.

The total number breeding in monitored colonies in **north Scotland** declined by 10% from 2003. A large decline of 96% to only four pairs in Easter Ross was partially compensated by increases at other sites. Following the 67% decline between 2002 and 2003, numbers at Barmac's doubled in 2004. Similarly, numbers at Brora recovered after the declines of 2002 (5 pairs) and 2003 (6 pairs) to 48 pairs. The colony at Arduillie, newly established in 2003, increased from 12 to 36 pairs. Two colonies in Caithness increased from 25 to 42 pairs. A minimum of 1,500 Arctic terns were present at six colonies on Stroma Island on 4 July (R. Sellers, pers. comm.) and "thousands of adult terns" were still present on 16 July (S. North, pers. comm.), which suggests that large numbers of Arctic terns nested there in 2004.

After the record low in 2003, numbers in **north-east Scotland** increased by 17%. This was largely attributable to an increase at St Fergus by almost 70%, although numbers were still below the long-term mean for the site. An increase was also noted at Kinloss, although numbers were only around a third of the long-term mean of 183 pairs (s.d.±79). Numbers halved at River Spey (40 pairs) and the Sands of Forvie, the latter colony only holding 10% of the numbers of 2002. After the low in 2002, numbers at the Isle of May, **south-east Scotland**, increased by over 15% since 2003. Two pairs nested at the Eden Estuary and one at Aberlady.

Overall numbers in **north-east England** increased to their highest level since 1987. The largest increase occurred at the Farne Isles, although numbers remained below the long-term mean. At Lindisfarne, 30 common/Arctic terns were recorded, compared with at least 60 in 2003. Only eight Arctic terns were reported from two sites in **east England**, 12 fewer than in 2003.

Ten sites visited as part of the Mink-Seabird Project in **north-west** and **south-west Scotland** held 328 pairs, a 152% increase from the low in 2003. An additional 25 pairs were present on Fladda, Sound of Luing, but there was no evidence of breeding (Craik 2004). Outwith this study area, no Arctic terns nested on Handa in 2004 after two years of decline, whilst those on the Isle of Eigg increased by 50% to 120 pairs. Elsewhere, the colony at The Reef, Tiree, increased from 48 pairs in 2003 to 88 pairs in 2004, and a count of 15 other colonies on Tiree revealed 601 pairs, an increase of 20% from 2003. However, the birds were late to settle and most clutches were abandoned within days of laying. In contrast to previous years, the ternery on the Treshnish Isles comprised *c.*90% of Arctic terns (*c.*360 birds) and only 10% of common terns (R. Ward, pers. comm.).

After three years of increase, numbers on Foulney, **north-west England**, declined to 2000 levels. A small overall decrease occurred in **Wales**, where an 8% decline at the Skerries was not entirely compensated by increases at two other Welsh colonies. On the **Isle of Man**, 15 pairs were reported nesting compared with seven pairs in 2003.

Table 3.21.2 Population changes of Arctic terns 2003–2004 and 1986-2003 at selected sites referred to in the text. (P = pairs; I = individuals).

Region/Site		2003	2004	2003-2004 % change	1986-2003 Mean (±s.d.)	1986-2003 No. years
SW Scotland						
Fladda, Sd Luing	P	0	0	0.00	82 (114)	9
NW Scotland						
Isle of Eigg	P	80	120	+50.0	53 (48)	17
Shetland						
Fair Isle	P	80	11	-86.3	864 (702)	17
Foula	P	*c.*50	0		689 (429)	17
Fetlar	P	192	67	-65.1	538 (341)	13
Orkney						
North Hill	I	638	15	-97.7	2,222 (1,148)	16
Rousay	I	300	0		610 (438)	2
N Scotland						
Nigg	P	105	4	-96.2	97 (60)	14
NE Scotland						
Sands of Forvie	P	58	25	-56.9	89 (68)	15
St Fergus	P	180	305	+69.4	333 (138)	16
SE Scotland						
Isle of May	P	577	666	+15.4	475 (242)	18
NE England						
Coquet	P	765	828	+8.2	659 (159)	18
Farnes	P	1,721	1,970	+14.5	2,564 (977)	18
Long Nanny	P	*c.*1,350	1,473	+9.1	574 (623)	16
Wales						
Skerries	P	1,634	1,505	-7.9	870 (448)	16
NW England						
Foulney	P	49	33	-32.7	43 (12)	17
NE Ireland						
Strangford Lough	P	272	414	+52.2	165 (88)	18
Big Copeland	P	*c.*800	*c.*1,000	+25.0	377 (232)	12
SE Ireland						
Rockabill	P	139	211	+51.8	39 (43)	18

All monitored colonies in **north-east Ireland** reported increases of between 25% and 52% in 2004. Numbers at Strangford Lough and Big Copeland reached record highs, and on Green Island there were 58 pairs, above the long-term mean (1986-2003 mean = 18 pairs, s.d.±14). Numbers at Rockabill, **south-east Ireland**, continued to increase, reaching a record high of 211 pairs. In 2004, 361 pairs nested on Lady's Island Lake compared with an estimated 188 pairs in 2002 (no count was made in 2003).

Breeding success (Tables 3.21.3 and 3.21.4)

Largely due to lack to lack of food and bad weather, productivity was generally low, with that in Shetland and Orkney the lowest. Arctic terns in south-east Ireland were more productive.

The lack of available sandeels resulted in an extremely poor breeding season in **Shetland**, with only three young fledged from 72 pairs at Noss, and five fledged chicks reported from the Scalloway Islands.

Arctic terns in **Orkney** suffered a similarly poor breeding season and most colonies failed to rear any young. Some success was reported from Swona, where 82 chicks were ringed on 3

July and many birds were still incubating, and from the Golta peninsula (Flotta), where 55 chicks were ringed. However, the outcome for both sites is unknown. On the Taing of Sandside, Graemsey, 10 fledged young were seen with 90 adults on 22 July, and it is thought that they were reared nearby (Meek 2004).

Overall productivity for the small colonies monitored in **north Scotland** was again very low, although slightly higher than in 2003. Across five colonies, a total of 91 pairs failed to fledge any young, whilst productivity at Brora was 0.26 chicks per pair (n=42), the highest for three years. At Kintradwell, 62 pairs fledged 26 young. In contrast, a visit to Stroma on 16 July noted "several hundred" fledged young in the air with "several dozen" close to fledging (S. North, pers. comm.).

In **north-east Scotland**, four colonies totalling 140 pairs experienced complete breeding failure. The island at Garmouth (River Spey) flooded in early June, and at the Sands of Forvie avian predation and a food shortage resulted in an unproductive season. In contrast, the colony at St Fergus was thought to have experienced a successful breeding season and despite fox predation, at least 40 chicks fledged from 305 pairs (probably a considerable underestimate; Paterson and Puttick 2004).

Table 3.21.3 Arctic tern productivity, 2003–2004, 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). (- indicates no data were available).

Region	2003 chicks fledged/pair			2004 chicks fledged/pair		
	Pairs[n]	Range	Overall	Pairs[n]	Range	Overall
SW Scotland	102[12]	0.00-2.07	0.95	1,088[24]	0.00-1.75	0.31
NW Scotland	35[3]	0.00-2.00	1.06	180[9]	0.00-1.00	0.25
Shetland	543[6]	0.00-0.33	0.12	267[6]	0.00-0.52	0.01
Orkney	1,024[4]	0.00-0.20	0.03	774[8]	0.00	0.00
N Scotland	198[9]	0.00-0.67	0.04	226[7]	0.00-0.42	0.18
NE Scotland	375[5]	0.00->0.25	>0.12	140[4]	0.00	0.00
SE Scotland	4[1]	-	>0.25	3[2]	0.00	0.00
NE England	3,836[3]	0.59-0.95	0.77	4,271[3]	0.07-0.41	0.20
E England	20[2]	0.06-1.00	0.15	8[2]	0.00	0.10
Wales	2,044[3]	0.78-1.56	*c*.1.46	1,962[2]	0.49-0.50	0.49
NW England	49[1]	-	0.55	33[1]		0.24
SE Ireland	139[1]	-	0.40	211[1]		<0.66

Overall productivity in **north-east England** was, at 0.20 chicks per pair, the lowest since 1990. Poor weather severely affected the colonies and a subsequent food shortage was reported from Long Nanny, Coquet and the Farne Islands, depressing productivity further (Lane and Taylor 2004, Walton *et al.* 2004, Lowe *et al.* 2004). A productive season was reported only from Lindisfarne, where 30 common/Arctic terns fledged 30 young. Due to the inclement weather, eight pairs in **east England** failed to fledge any chicks.

Productivity at the Mink-Seabird Project colonies in **west Scotland** ranged between 0.69 and 0.89 chicks per pair - lower than in 2003 (1.03 chicks per pair). Predation by otter and peregrine falcon depressed productivity at two sites and a brief episode of mink predation

affected breeding success at a third colony (Craik 2004). However, *c.*90 pairs on Glas Eileanan, Sound of Mull, (where mink were controlled) fledged *c.*130 young. In a sample of seven colonies on North Uist and Benbecula, 117 pairs nested fledging 33 young (Smith 2004) whilst the colony on the Isle of Eigg was washed out in June (J. Chester, pers. comm.). No chicks fledged from Tiree, whilst the colony of 80 pairs on Gunna was very productive, with over 140 fledged young.

In **north-west England**, despite depredation by kestrel *Falco tinnunculus* and unfavourable weather, eight young fledged from 33 pairs at Foulney. After seven very successful years, productivity in **Wales** was, at around 0.49 chicks per pair, comparatively low. On the **Isle of Man**, 10 young fledged from 15 pairs.

Once again, as in 2003, the Arctic terns on Big Copeland (**north-east Ireland**), raised few chicks; only 50 young fledged from *c.*1,000 nesting pairs (0.05 chicks per pair). It is suspected that 90% of losses were due to sheep eating eggs and chicks with further losses due to high tides and predation by gulls and peregrine falcons (N. McKee, pers. comm.). Productivity on Rockabill, **south-east Ireland**, was higher than that in 2003, although post-fledging predation by peregrine falcon was observed (Hall *et al.* 2004).

Table 3.21.4 Productivity of Arctic terns expressed as chicks per pair during 2003–2004 and 1986-2003 at selected sites referred to in the text.

Region/site	2003	2004	1986-2003 mean (±s.e.)	No. of years
SW and NW Scotland				
The Reef, Tiree	-	0.00	-	-
Isle of Eigg	-	0.01	0.15 (0.08)	6
Shetland				
Foula	0.00	-	0.15 (0.05)	16
Fair Isle	0.00	0.00	0.26 (0.09)	14
Fetlar	0.03	0.00	0.14 (0.06)	13
Orkney				
North Hill, Papa Westray	0.00	0.00	0.10 (0.10)	10
NE Scotland				
Sands of Forvie	>0.03	0.00	0.29 (0.09)	13
Kinloss	0.00	0.00	0.17 (0.07)	10
St Fergus	>0.22	>0.14	0.10 (0.04)	11
SE Scotland				
Isle of May	*0.30 'commics'*	*0.10 'commics'*	0.32 (0.08)	12
NE England				
Farnes	0.90	0.20	0.60 (0.12)	8
Coquet	0.95	0.41	0.77 (0.08)	14
Long Nanny	*c.*0.59	0.07	0.69 (0.13)	14
Wales				
Skerries	1.44	0.50	1.11 (0.11)	14
NW England				
Foulney	0.55	0.24	0.35 (0.06)	18
SE Ireland				
Rockabill	0.40	≤0.66	0.94 (0.14)	8

3.22 Little tern *Sterna albifrons*

There was little overall change between 2003 and 2004 in numbers of little terns breeding in sample colonies in Britain and Ireland, although inter- and intra-regional variation occurred. Overall, 2004 was an unproductive season with many colonies, particularly in E and SE England, experiencing total breeding failure. However, colonies in NW England, Wales and SE Ireland were very productive.

Breeding numbers (Tables 3.22.1 and 3.22.2)

In **south-west Scotland**, all major sites reported increases in numbers, resulting in a total of at least 118 pairs (72 in 2003). After four years of decline, the little tern colony at Coll increased to 27 pairs (+125% from 2003), almost returning to its 1999 level. A minimum of 50 pairs nested on Tiree, compared with 47 in 2003. At Gunna, numbers almost trebled from 2003 to 28 pairs in 2004. In **north-west Scotland**, each of two small colonies increased by one pair.

Four pairs were present at four sites in **Orkney**, but it is not known whether any of those bred. Overall numbers across monitored colonies in **north Scotland** remained at 26 pairs, similar to that in 2003.

In **north-east Scotland**, a 40% decrease occurred at the Sands of Forvie between 2003 and 2004, where numbers are now at their lowest since 1996. On the Eden Estuary (**south-east Scotland**), numbers doubled to 22 pairs over the same period.

In **north-east England**, overall numbers remained similar to those in 2003, but with variation between colonies. Decreases of between five and 11 pairs occurred at Long Nanny, Donna Nook and Lindisfarne, with numbers at Long Nanny falling to their lowest since 1995. In contrast, the colonies at Gibraltar Point and Crimdon Denes reached record high levels.

Table 3.22.1 Population changes at monitored little tern colonies, 2003–2004 (breeding pairs). Regional samples < 40 pairs are excluded. Superscript = number of occupied colonies counted in both years. (*The Great Britain total is for monitored colonies only and is not a population estimate for the whole country).

Region	2003	2004	2003-2004 % change
SW Scotland	72	118	+63.9[4]
NE England	194	*c.*202	+4.1[7]
E England	*c.*718	696	-3.1[22]
SE England	219	169	-22.8[9]
SW England	40	56	+21.7[1]
Wales	110	89	-19.1[1]
Great Britain*	**1,328**	**1,263**	**-4.9[43]**
SE Ireland	77	89	+11.7[1]

Similarly, there was little overall change in **east England**. At Winterton and Great Yarmouth, over 300 little terns were present, moving between the two sites, reluctant to settle. This behaviour was thought to be the consequence of a localised food shortage (Martin Perrow, pers. comm.). Most eventually settled at Winterton, with the highest count of 150 pairs in mid June, only around two-thirds the number present in 2003. A maximum of 17 pairs nested at Great Yarmouth, although these may have included birds that relocated from Winterton. At Eccles - colonised in 2002 after the build-up of shingle and sand behind the recently constructed offshore reefs - numbers continued to increase, to 47 pairs. For the fourth year, there was no change at Scolt Head (90 pairs), but the two other main sites in the

area, Holkham and Blakeney, decreased by 23 and 35% respectively, to figures below the long-term means for each site (99 and 131 pairs). After a three-year absence, little terns returned to Minsmere (15 pairs). At Colne Point, numbers reached around 53 pairs, their highest level since 1987. Between 50 and 60 pairs nested at Benacre, a site that was almost deserted after disturbance in 2003. At Hamford Water, where numbers fell by almost 50% of the 2003 total to 47 pairs, similar to the 2002 level.

Numbers in **south-east England** declined by over 20% between 2003 and 2004. Increases occurred at Langstone Harbour, where pairs returned after their absence in 2003, and Swale (6 pairs in 2003, 15 in 2004). For the first time in five years, two pairs nested at North Solent. These increases did not compensate for the declines at Hayling, where only a third of those nesting in 2003 was recorded, and Rye Harbour (25 pairs in 2003, 18 in 2004).

The colony at Chesil Bank, **south-west England**, increased by 40% from 2003, but remained below the long-term mean of 63 pairs.

Although numbers at Gronant, **Wales**, declined by almost 20% from the record high in 2003, they remained above the long-term mean.

Table 3.22.2 Population changes of little terns 2003–2004 and 1986-2003 at selected sites referred to in the text. Figures refer to numbers of breeding pairs.

Region/Site	2003	2004	2003-2004 % change	1986-2003 Mean (±s.d.)	1986-2003 No. years
N Scotland					
Dalchalm	15	13	-13.3	11 (13)	15
E Scotland					
Sands of Forvie	29	16	-44.8	32 (22)	18
NE England					
Saltfleetby	0	0	0.00	6 (7)	18
Gibraltar Point	49	52	+6.1	27 (16)	18
Tetney	0	2	-	30 (32)	18
Crimden Dene	40	*c.*65	+62.5	18 (23)	18
Long Nanny	42	32	-23.8	37 (13)	18
Easington Lagoon	30	36	+20.0	38 (19)	18
E England					
Blakeney	116	75	-35.3	131 (40)	18
Holkham	83	64	-22.9	100 (27)	18
Great Yarmouth	9	17	+88.9	178 (75)	18
Winterton Dunes	233	150	-35.6	*c.*105 (103)	4
Benacre	7	*c.*55	*c.*+685.7	15 (23)	16
SE England					
Rye Harbour	25	18	-28.0	36 (16)	18
Hayling Oysterbeds	125	*c.*42	-66.4	67 (60)	6
SW England					
Chesil Bank	40	56	+40.0	63 (23)	18
Wales					
Gronant	110	89	-19.9	63 (20)	18
NW England					
Hodbarrow	15	28	+86.7	18 (8)	18
Foulney Is	*c.*5	2	-60.0	10 (10)	18
SE Ireland					
Kilcoole	77	86	+11.7	35 (15)	17

Numbers at Hodbarrow, **north-west England**, increased to their highest level since 1987. The small colony at Haverigg was not monitored but 6-10 birds were active early in the season. Two pairs nested at Foulney, compared with five or so in 2003.

On the **Isle of Man**, numbers declined by 29% to 15 pairs.

At Kilcoole, **south-east Ireland**, a further increase, of 12%, occurred, following the large increase between 2002 and 2003.

Breeding success (Table 3.22.3, Table 3.22.4)

Bad weather, localised food shortages and predation depressed productivity at most sites. Overall productivity in Scotland, at 0.40, was slightly below that of 2003, but above average (1986-2003 mean = 0.37 chicks per pair, s.e.±0.05). East and south England regions experienced one of the least productive seasons ever recorded. In contrast, all colonies in Wales, north-west England and south-east Ireland were very productive.

On Tiree, **south-west Scotland**, productivity was low with only 11 chicks fledging from a minimum of 50 pairs. Most nests failed in mid-June during a prolonged period of cool and wet weather (J. Bowler, pers. comm.). At nearby Gunna, productivity was 0.35 chicks per pair (n=28), whilst little terns on Coll were productive with 27 pairs fledging 34 young. Some clutches depredated by Oystercatchers at this site were quickly replaced (S. Wellock, pers. comm.).

In **north Scotland**, productivity at Dalchalm was moderate, at 0.69 chicks per pair, whilst 13 pairs at two other sites were unsuccessful.

Table 3.22.3 Little tern productivity, 2003–2004, 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	2003 chicks fledged/pair			2004 chicks fledged/pair		
	pairs^{n}	range	overall	pairs^{n}	range	overall
SW Scotland	59^{8}	0.00-2.00	0.62	91^{8}	0.00-1.26	0.49
Orkney	-	-	-	-	-	-
N Scotland	28^{3}	0.00-0.73	0.50	26^{3}	0.00-0.69	0.35
NE Scotland	36^{2}	0.07-0.29	>0.11	22^{2}	0.00-0.67	0.18
SE Scotland	*c.*11^{1}	-	>0.27	22^{1}	-	0.27
Scotland total	134^{14}	0.00-2.00	**>0.43**	161^{14}	0.00-1.26	**0.40**
NE England	196^{7}	0.00-0.93	0.31	204^{7}	0.00-*c.*0.92	*c.*0.25
E England	718^{13}	0.00-2.04	>1.13	*c.*689^{16}	0.00-1.00	*c.*0.15
SE England	162^{5}	0.00-1.24	0.20	176^{8}	0.00-0.28	0.03
SW England	40^{1}	-	0.10	56^{1}	-	0.04
Wales	110^{1}	-	≥1.77	89^{1}	-	1.90
NW England	23^{3}	0.00-0.40	0.26	30^{2}	1.00	1.00
England and Wales total	1,249^{30}	0.00-2.04	***c.*0.89**	1,244^{35}	0.00-1.00	**0.29**
SE Ireland	77^{1}	-	2.30	86^{1}	-	2.20

Overall productivity in **east Scotland** was low, although slightly higher than in the previous three years. At least four chicks fledged from six pairs at Lossiemouth, but only six from 22 pairs at Eden Estuary. Avian predation and a suspected food shortage resulted in a breeding failure at the Sands of Forvie (A. Drysdale, pers. comm.).

In **north-east England,** overall productivity was similarly low to that in 2003. Due to predation by foxes and inclement weather, no chicks fledged at Easington and Crimden Denes, and productivity was depressed at Long Nanny and Gibraltar Point. Only at Lindisfarne were little terns productive. It is thought that this was a result of relocation of 70% of the colony, possibly induced by model decoys and tape playback, to a more protected adjacent mainland site, already used by Arctic and common terns.

Table 3.22.4 Productivity (chicks fledged per pair) of little terns 2003–2004 and 1986-2003 at selected sites referred to in the text.

Region/site	2003	2004	1986-2003	
			mean (±s.e.)	No. of years
N Scotland				
Dalchalm	0.73	0.69	0.60 (0.13)	10
NE Scotland				
Sands of Forvie	>0.07	0.00	0.32 (0.08)	16
Lossiemouth	0.29	0.67	0.66 (0.38)	5
NE England				
Long Nanny	0.26	0.44	0.55 (0.12)	18
Gibraltar Point	0.14	0.46	0.29 (0.06)	18
Crimden Dene	*c.*0.93	*c.*0.02	0.68 (0.21)	9
Easington Lagoons	0.00	0.00	0.41 (0.10)	18
Lindisfarne	0.00	≥0.92	0.59 (0.18)	16
E England				
Great Yarmouth	0.22	0.00	0.72 (0.14)	17
Winterton Dunes	*c.*2.04	0.00	0.68 (0.46)	4
Benacre	0.00	*c.*0.09	0.43 (0.21)	8
Hamford Water	*c.*1.76	0.85	1.01 (0.20)	9
SE England				
Chichester Harbour	0.00	-	0.21 (0.10)	14
Hayling Island, Langstone	0.01	*c.*0.03	1.13 (0.37)	6
Langstone Harbour	-	0.00	0.39 (0.11)	17
Rye Harbour	1.24	0.28	0.37 (0.09)	17
SW England				
Chesil Bank	0.10	0.04	0.29 (0.05)	18
Wales				
Gronant	1.77	1.90	0.93 (0.15)	18
NW England				
Hodbarrow	0.27	1.00	0.30 (0.08)	18
SE Ireland				
Kilcoole	2.30	2.20	0.95 (0.19)	17

Productivity in **east England** was the lowest for 19 years, where several sites reported a late start to the breeding season, and severe weather and localised food shortages depressed productivity at sites such as at Blakeney and Winterton/Great Yarmouth. Predation by kestrel depleted chicks at Eccles. At Titchwell, one young fledged from four pairs, the first since 1994. Holkham was slightly more successful than other sites in Norfolk, with 0.25 chicks fledged per pair being higher than in 2003 (0.11). Suffolk colonies were generally more productive, although bad weather affected most sites to some extent. At Hamford Water, 47 pairs raised 40 young, and at Minsmere 15 young fledged, the highest number for 10 years. However, productivity at Colne Point was only 0.08 chicks per pair, far lower than that in 2003 (0.69).

Overall productivity in **south-east England** was the lowest since the start of the SMP in 1986. Food was apparently abundant for most of the season, but a storm in June and tidal inundation accounted for most of the losses. Only six young fledged in the region: one at

Hayling and five at Rye Harbour. At Deadmen's Island, little terns failed for a seventh consecutive year.

At Chesil, **south-west England**, depredation by foxes and unfavourable weather resulted in a fourth year of very low productivity.

For a third year in succession, the colony at Gronant, **Wales**, was very successful: productivity was higher than in 2003 and the number of chicks fledged was the second highest recorded for this site. However, 31 nests were thought to have been lost to sandblow and cold winds (R. Hurst, pers. comm.).

A record number of chicks fledged from the colony at Hodbarrow, **north-west England**. Two young fledged from two pairs on Foulney Island.

On the **Isle of Man**, heavy rain and predation resulted in a low productivity of 0.27 chicks per pair (L. Samson, pers. comm.).

A record number of young fledged from the colony at Kilcoole, **south-east Ireland**, and productivity was high at 2.2 chicks per pair, although slightly lower than in 2003. Food was plentiful and consisted largely of sandeels. Some chicks, however, succumbed to a brief period of severe weather (Veldman *et al.* 2004).

3.23 Common guillemot *Uria aalge*

Between 2003 and 2004, counts of sample plots and/or of whole colonies demonstrated substantial decreases in the numbers of guillemots at colonies in Orkney, Shetland and along the east coast of Britain, with the exception of the Farne Islands, NE England, where the colony increased in size. In contrast, on the west coast of Britain and in eastern Ireland, numbers either increased or remained unchanged, except in Wales, where sample plot counts indicated a decline in numbers at some colonies but not to the same extent as in the east of Britain. Long-term data prior to 2004, show increases in the population indices in all regions, except Shetland, where a 50% reduction has occurred since 1986. Mean productivity in 2004 was by far the lowest in the history of the SMP. Colonies on the east coast of Britain were less successful than those on the west, with many recording their lowest productivity since monitoring began. Chick mortality was particularly high in Shetland: remarkably, no young were raised on Fair Isle, few at Sumburgh Head and visits to other colonies also recorded few young. Prior to 2003 and 2004, productivity of guillemot at colonies monitored throughout Britain has varied little from year to year, which makes the breeding failures observed in 2004 all the more significant.

Breeding numbers (Tables 3.23.1 and 3.23.2, Figure 3.23.1)

In **Shetland**, the regional population index declined for the fourth successive year. Numbers in plots were 13% lower than in 2003, with decreases noted at all colonies except Burravoe, although only the changes at Eshaness (-48%, $t=4.140$, d.f.=8, $P<0.01$) and Fair Isle (-26%, $t=8.724$, d.f.=13, $P<0.001$) were significant. There was large variation between repeated counts of plots at Eshaness which, coupled with little observed predation, suggests extensive non-breeding in this colony at least (Heubeck 2004). Large declines were also noted at sites where whole colony counts were carried out. On Noss, the count of 22,251 individuals represented a decline of 51% since 2001 (Sykes and Bliss 2004). A similar magnitude of decline was noted on Hermaness, where numbers fell from 10,439 individuals in 2000 to just under 6,000 in 2004 (Wilson 2004).

Large declines were also recorded in **Orkney**. Numbers of common guillemot in the study plots on Papa Westray decreased by 33% compared with 2003. At two colonies where complete counts were carried out, Marwick Head and Noup Cliffs, numbers decreased by 60% to 10,476 and by 33% to 25,237 individuals respectively, both since 1999.

In **north-east Scotland**, triennial monitoring of sample plots found significant decreases in numbers since 2001: of 24% in the Gamrie to Pennan SPA ($t=4.426$, d.f.=7, $P<0.01$) and of 20% in the Buchan Ness to Collieston SPA ($t=4.338$, d.f.=8, $P<0.01$). There was no significant change at Fowlsheugh, although numbers in plots had decreased by 5% over the same period. This is the first time since monitoring began in 1986 that the population index for guillemots in north-east Scotland has fallen.

In **south-east Scotland,** moderate declines were recorded in sample plots at St Abb's Head and at colonies monitored via complete counts, at many of which (e.g. Isle of May, Craigleith, The Lamb and Bass Rock) the population fell by between 12-20% since 2003. The decrease noted at St Abb's Head was highly significant ($t=7.082$, d.f.=10, $P<0.001$). Between 1986 and 2000, the trend in this region was generally upward, with occasional fluctuations but since then the trend has been downward. As in many other regions in 2004, the cause of such large declines was probably non-attendance at the colony by adults; this phenomenon was prevalent on the Isle of May where, unusually, many chicks were left unattended by adults (Harris *et al.* 2004).

In contrast to elsewhere on the east coast of Britain, the number of guillemots on the Farne Islands, the sole monitored colony in **north-east England,** increased since 2003 (for the fifth successive year) and thus continued an upward trend that has been evident since 1992.

Table 3.23.1 Regional population changes at monitored common guillemot colonies, 2003-2004 (adults attending colony in first three weeks of June). Trends for 1986-2003 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. Figures are summed means of 5-10 replicate counts of each of the study plots.

Region	2001	2003	2004	% change since previous count	% annual change
NW Scotland [a]		3,268	3,266	<-0.1	+1.0** 1986-2003
Shetland [b]		7,125	6,236	-12.5	-1.2 n.s. 1986-2003
Orkney [c]		320	213	-33.4	+3.9* 1986-2003
NE Scotland [d]	9,224	-	7,828	-15.1	+5.1** 1986-2001
SE Scotland [e]		1,812	1,444	-20.3	+3.4*** 1986-2003
Wales [f]		13,030	12,017	-7.8	+6.0*** 1986-2003

Colonies: [a] Handa; [b] Hermaness, Burravoe, Eshaness, Noss, Troswick Ness, Sumburgh Head, Fair Isle; [c] Papa Westray; [d] Troup/Lion's Head, Bullers of Buchan, Fowlsheugh; [e] St Abb's Head; [f] South Stack, 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	2003	2004	2003-2004 % change	% annual change
SW Scotland [a]	2,113	2,275	+7.7	+4.6** 1986-2003
SE Scotland [b]	34,609	29,355	-15.2	+3.2*** 1986-2003
NE England [c]	42,338	43,694	+3.2	+5.3*** 1986-2003
Wales [d]	30,579	29,952	-2.0	+5.6*** 1986-2003
SW England [e]	1,335	1,738	+30.2	-
NW England [f]	8,260	8,146	-1.4	+2.9** 1986-2003
NE Ireland [g]	1,404	1,595	+13.6	-

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

In regions along the west coast of Britain and in Ireland, numbers appeared to be relatively stable or showed signs of increase between 2003 and 2004. There was no change evident in the population in sample plots on Handa (**north-west Scotland**). In **south-west Scotland**, a small increase was noted at Mull of Galloway. Elsewhere in the region, a large apparent increase occurred on Lunga, where counts are carried out later than at other colonies, usually in the last week of June or early July, so the observed increase may have been an artefact of the late breeding season. Numbers at St Bee's Head (**north-west England**) also changed little over the period. All three regions show a significant positive trend over the long-term, with relatively stable indices in recent years except in south-west Scotland, where several fluctuations have occurred.

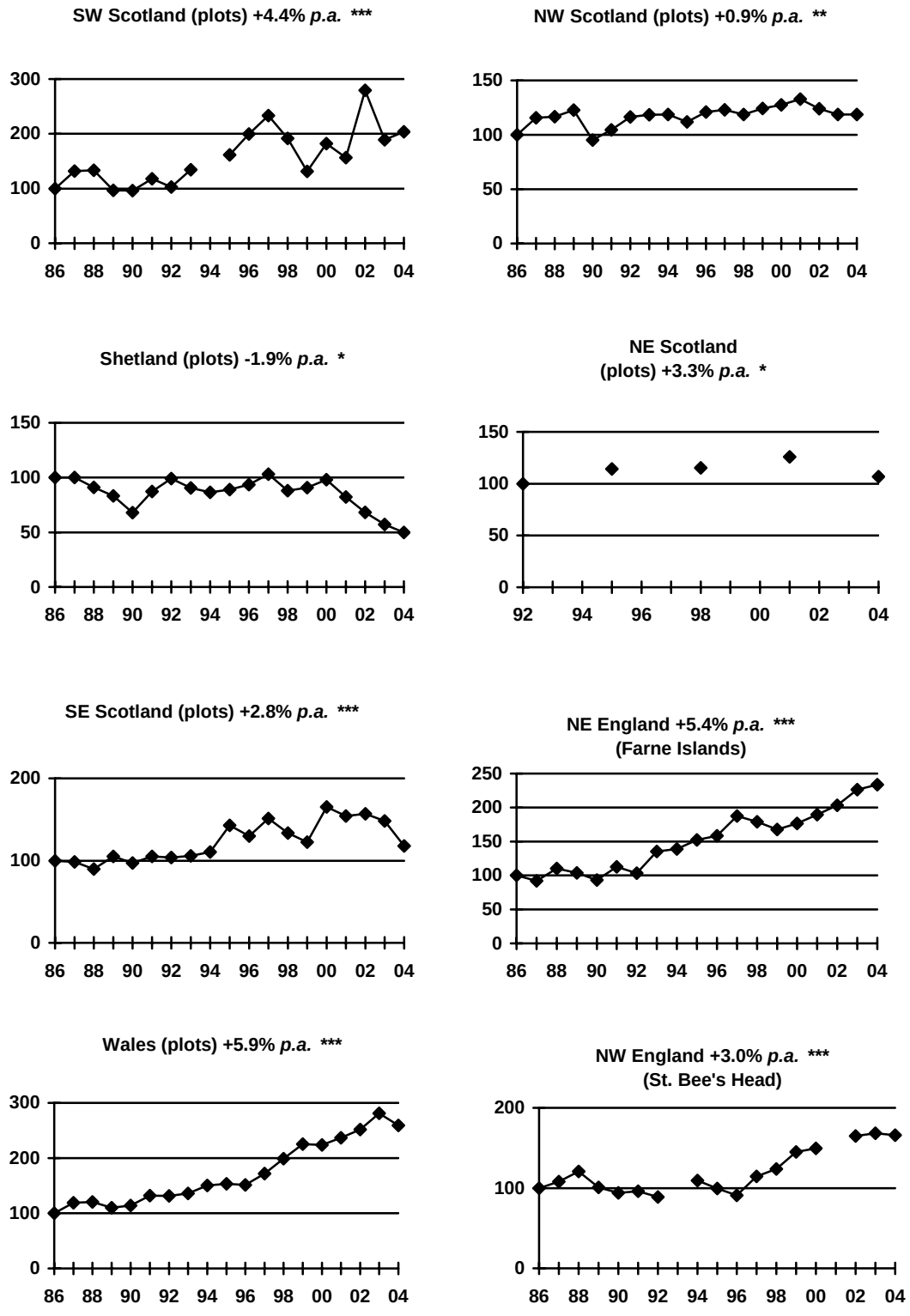

Figure 3.23.1 Regional population indices for breeding common guillemots, 1986-2004 (counts of adults in June). Average annual rates of change were calculated by regression of natural log of index against year (see section 1.2.2. for details). Statistical significance of trends (t-test) indicated as: n.s. not significant, * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

Table 3.23.2 Population changes of common guillemots 2003-2004 and 1986-2003 at selected sites referred to in the text. P\W indicates plot or whole-colony counts.

Region/Site		2003	2004	2003-2004 % change	1986-2003	
					Mean (±s.d.)	No. years
SW Scotland						
Mull of Galloway	W	2,113	2,275	+7.7	1,669 (601)	17
Lunga	W	7,316	10,385	+41.9	7,345 (1,107)	11
NW Scotland						
Handa	P	3,268	3,266	<-0.1	3,419 (148)	6
Shetland						
Noss	P	1,701	1,596	-6.2	2,591 (345)	18
Hermaness	P	1,739	1,674	-3.7	2,847 (679)	9
Eshaness	P	280	146	-47.9	373 (58)	18
Troswick Ness	P	246	230	-6.5	336 (39)	15
Sumburgh Head	P	1,006	925	-8.0	1,550 (321)	18
Burravoe	P	131	144	+9.9	193 (37)	16
Fair Isle	P	2,022	1,522	-24.7	2,658 (451)	14
Orkney						
Papa Westray	P	320	213	-33.4	576 (363)	2
SE Scotland						
Forth Islands total	W	4,737	4,125	-12.9	-	-
Craigleith	W	2,119	1,780	-16.0	1,803 (646)	14
The Lamb	W	1,987	1,744	-12.2	2,892 (810)	17
Fidra	W	595	566	-4.9	326 (218)	14
Isle of May	W	26,722	22,970	-14.0	21,802 (4,435)	18
Bass Rock	W	2,820	2,260	-19.9	3,260 (587)	7
St Abb's Head	P	1,812	1,444	-20.3	1,559 (303)	15
NE England						
Farne Islands	W	42,338	43,694	+3.2	27,285 (7,888)	18
SW England						
St Aldhelm's-Durlston	W	686	752	+9.6	544 (104)	15
Berry Head	W	649	986	+51.9	834 (139)	10
Wales						
Elegug Stacks	P	3,501	3,227	-7.8	1,984 (685)	16
	W	10,342	10,049	-2.8	6,785 (1,903)	11
Stackpole Head	P	485	368	-24.1	402 (68)	8
	W	1,070	1,151	+7.6	973 (117)	14
Skokholm	P	227	320	+22.1	262 (-)	1
	W	1,073	1,202	+12.0	750 (255)	13
Skomer	P	4,074	4,254	+4.4	2,600 (1,048)	18
	W	14,676	14,187	-3.3	9,558 (3,168)	18
South Stack	P	4,708	3,847	-18.3	3,177 (472)	18
Bardsey	W	711	688	-3.2	415 (210)	15
St Margaret's Island	W	392	543	+38.5	460 (86)	11
NW England						
St Bee's Head	W	8,260	8,146	-1.4	5,750 (1,282)	16
NE Ireland						
Isle of Muck	W	1,404	1,595	+13.6	1,067 (305)	5

The highest average annual rates of increase have been recorded in **Wales,** but in 2004 numbers decreased in sample plots for the second successive year, although there was little change noted in whole colony counts. Among colonies monitored by sample plots, significant decreases were recorded at Elegug Stacks (-8%, $t=3.476$, d.f.=8, $P<0.01$), Stackpole Head (-24%, $t=6.324$, d.f.=8, $P<0.001$) and South Stack (-18%, $t=3.032$, d.f.=7, $P<0.05$). Increases occurred in sample plots on Skomer and Skokholm, although only at the latter site was this significant (+22%, $t=5.137$, d.f.=14, $P<0.001$). Interestingly, the large decrease in numbers in plots at Stackpole Head was in contrast to a whole colony count there, where a small increase of 8% was noted over the same period. This may

suggest that selected plots are not representative of the colony as a whole; however, in 2004, these differences probably indicate nothing more than fluctuations in colony attendance on different count days, as was observed in Shetland. Elsewhere in the region, a whole-colony count detected a large increase on St Margaret's Island. Larger increases, of 30% and 14%, were evident in whole-colony counts in **south-west England** and **north-east Ireland,** respectively, since 2003. Numbers increased at the three colonies surveyed in these regions, with the count on the Isle of Muck the largest yet recorded. In **south-east Ireland**, the population of Lambay appeared to be stable between 1999 and 2004: 58,207 individuals were counted, a difference of only -3% since the previous count (S. Newton, pers. comm.).

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.

Mean productivity of common guillemots in 2004, from 11 UK colonies, 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 (1986-2003) was 0.72 (s.e. ±0.01), recorded from between three and 15 colonies annually. Colonies on the east coast were less successful than those on the west coast, with many recording their lowest levels of productivity - by some margin - since monitoring began.

Table 3.23.3 Breeding success of common guillemot, 2003-2004 and colony averages 1986-2003: 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 change (t-test) indicated as: ** P < 0.01.

Colony	**Colony average 1986-2003**			**2003 chicks fledged/pair**			**2004 chicks fledged/pair**			**2003-2004 change**	
	Years	**Mean**	**±s.e.**	**Sites[n]**	**Mean**	**±s.e.**	**Sites[n]**	**Mean**	**±s.e.**	**Mean**	**±s.e.**
Handa	16	0.70	±0.01	195[3]	0.68	±0.01	196[3]	0.72	0.06	+0.04	-
Sumburgh Head	15	0.64	±0.03	123[1]	0.29	-	108[1]	0.08	-	-0.21	-
Fair Isle	17	0.73	±0.02	174[2]	0.48	±0.06	169[2]	0.00	-	-0.48	-
Papa Westray	14	0.67	±0.04	231[1]	0.49	-	177[1]	0.21	-	-0.28	-
Marwick Head	17	0.71	±0.02	115[1]	0.53	-	84[1]	0.29	-	-0.24	-
Mull Head	14	0.72	±0.01	112[1]	0.70	-	86[1]	0.31	-	-0.39	-
North Sutor	10	0.68	±0.04	96[1]	0.49	-	89[2]	0.35	0.06	-0.14	-
Isle of May	18	0.77	±0.02	1,014[5]	0.68	±0.02	984[5]	0.50	0.01	-0.18	-
Durlston	7	0.84	±0.02	-	-	-	23[1]	0.74	-	-	-
Berry Head	2	0.62	0.03	32[1]	0.59	-	32[1]	0.66	-	+0.07	-
Skomer	15	0.73	±0.01	269[5]	0.76	±0.05	278[5]	0.66	0.02	-0.10	-
Total [no colonies]	-	-	-	2,361[10]	**0.57**	±0.04	2,226[11]	**0.41**	±0.08	**-0.19[10]**	- ±0.05**

Breeding success was by far the lowest on record at Sumburgh Head and Fair Isle (both **Shetland**), Papa Westray, Marwick Head and Mull Head (all **Orkney**), North Sutor (**north Scotland**) and the Isle of May (**south-east Scotland**). Egg laying occurred later than usual at Sumburgh Head, where the median laying date has become progressively later by an average of one week in each of the three years since 2001 (Heubeck 2004), and on the Isle of May where the median date was 10 days later than in 2003 (Harris *et al.* 2004). Hatching success was very low at Sumburgh Head (31%) and Fair Isle (48%; Shaw *et al.* 2004) and although higher on the Isle of May (77%) it was still below average (1986-2003 mean, 84%). Subsequently, many chicks were left unattended at all three colonies for long periods, suggesting that adults had difficulty in finding food.

Few sandeels were seen being brought to Shetland colonies, while diet studies on the Isle of May found that clupeids comprised 98% of 1,341 fish delivered to chicks. Low availability of high quality food (e.g. sandeels) was likely the cause of the much reduced breeding success at all the aforementioned colonies, whether directly - due to chick starvation - or indirectly - due to hypothermia, predation by great skuas or killing of the unattended young by neighbouring adults. Chick mortality was acutely high in Shetland: no young were raised on Fair Isle, few at Sumburgh Head and visits to other colonies also recorded few young, most notably in the usually large colony at Compass Head, where no adults or young were found in early July (Okill 2004b). Wing/weight ratios of chicks were nearly identical to that recorded in 2003, also a year of low success, but chicks of all wing lengths were, on average, 50g lighter than in 1999, a year of relatively high success (Heubeck 2004, Okill 2004b).

Compared with the east coast colonies, productivity was higher in regions on the west coast of Britain in 2004. On Handa (**north-west Scotland**) and at Berry Head (**south-west England**) common guillemots were more successful than in 2003 and productivity at both sites was slightly higher than their respective means. In 2004, breeding success was highest at Durlston Head (also **south-west England**), although lower than the colony mean. On Skomer (**Wales**), productivity was relatively high although lower than in 2003 and below the colony's long-term mean, largely due to predation of eggs and chicks by great black-backed gulls (Brown and Morgan 2004).

3.24 Razorbill *Alca torda*

Between 2003 and 2004, the number of razorbills in sample plots declined at colonies along the northern North Sea coast from Shetland to SE Scotland, increased in NW Scotland, and changed little in Wales. The results of whole-colony counts similarly showed little change in Wales but increases at colonies in SE Scotland, in contrast to changes in plot counts elsewhere in the region. Whole colony counts revealed increased numbers of razorbills in SW Scotland, a decrease in NE Ireland, with little change in all other regions that were not monitored using plot counts. Mean productivity in 2004 was markedly lower than the long-term UK mean, although no significant decrease occurred since 2003, also a year of low success. In 2004 there was large variation in productivity between different colonies, for example on Fair Isle, no chicks fledged for the first year on record, while productivity at North Sutor was the highest since monitoring began.

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 2003 and 2004. 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.

Table 3.24.1 Population changes at monitored razorbill colonies, 2003-2004 (adults attending colony in first three weeks of June unless otherwise indicated). Regional totals of fewer than 50 birds are excluded. Trends for 1986-2003 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.

3.24.1a 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	2001	2003	2004	% change since previous count	% annual change
NW Scotland [a]		430	504	+17.2	-
Shetland [b]		400	351	-12.2	+0.9 n.s. 1986-2003
Orkney [c]		26	22	-15.4	+3.7** 1986-2003
NE Scotland [d]	1,320		1,141	-13.6	+2.2* 1986-2001
SE Scotland [e]		151	107	-29.1	+4.1*** 1986-2003
Wales [f]		2,494	2,545	+2.0	+3.8*** 1986-2003

Colonies: [a] Handa; [b] Hermaness, Eshaness, Burravoe, Noss, Troswick Ness, Sumburgh Head, Fair Isle; [c] Papa Westray; [d] Troup/Lion's Head, Bullers of Buchan, Fowlsheugh; [e] St Abb's Head; [f] Skomer, Skokholm, 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	2003	2004	2003-2004 % change	% annual change
SW Scotland [a]	443	516	+16.5	+2.6 n.s. 1986-2003
SE Scotland (birds) [b]	3,105	3,313	+6.7	+4.4*** 1986-2003
SE Scotland (AOS) [c]	519	594	+14.4	-
NE England (AOS) [d]	244	236	-3.3	-
Wales [e]	6,629	6,971	+5.2	+2.9*** 1986-2003
NW England [f]	277	262	-5.4	+1.9 n.s. 1986-2003
NE Ireland [g]	872	573	-34.3	-

Colonies: [a] Colonsay, Mull of Galloway; [b] Isle of May; [c] Inchcolm, Inchkeith, Craigleith, Fidra, The Lamb, Bass Rock; [d] Farne Islands, Boulby; [e] Caldey, Stackpole Head NNR, Elegug Stacks plus nearby coast, Skokholm, Skomer, St M argaret's Island; [f] St Bee's Head; [g] Isle of Muck.

For regions where razorbills are monitored using sample plots, the pattern of changes between 2003 and 2004 was similar to that of the common guillemot, with a decrease in numbers on the east coast of Britain and increases or little change on the west coast. However, regional changes assessed from counting whole colonies did not completely match this geographical pattern.

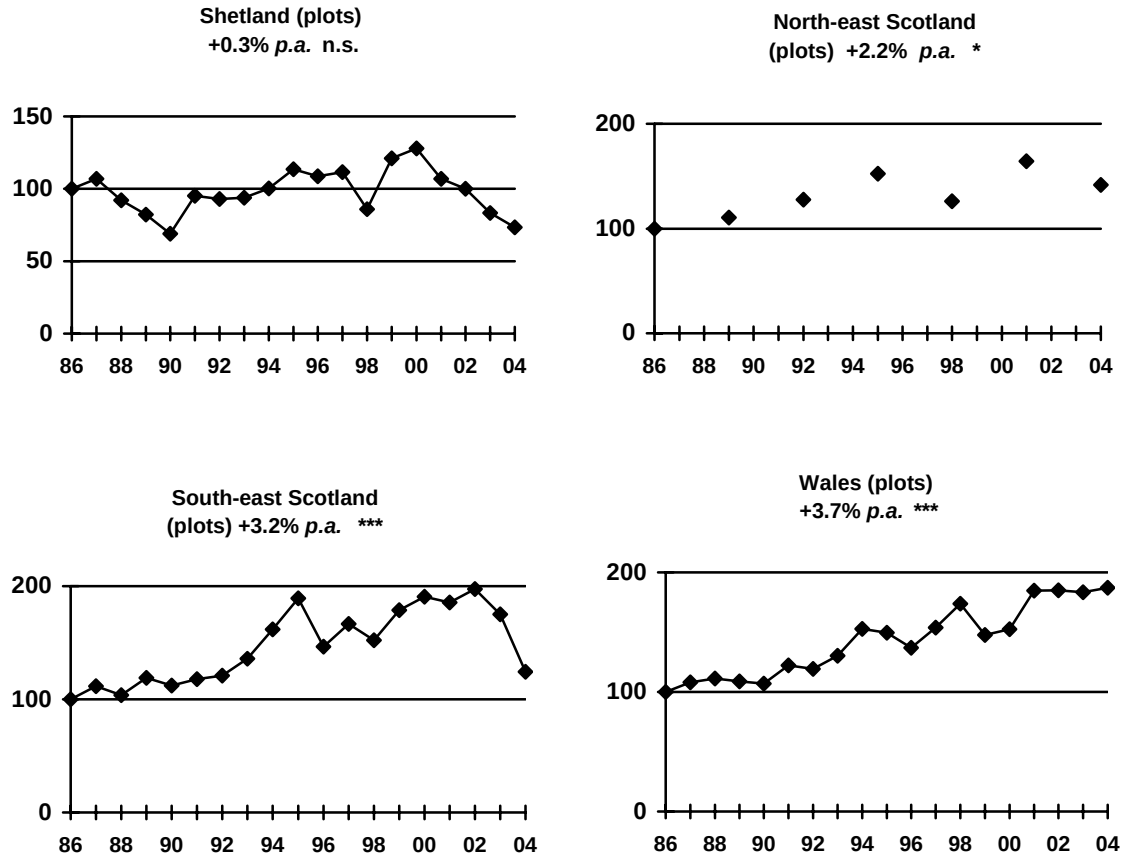

Figure 3.24.1 Regional population indices for breeding razorbills in various regions, 1986-2004 (counts of adults in June). Average annual rates of change were calculated by regression of natural log of index against year (see section 1.2.2. for details). Statistical significance of trends indicated as: n.s. not significant, * P<0.05, *** P<0.001.

In **Shetland**, the regional population index decreased for the fourth successive year. Numbers in sample plots decreased at all colonies monitored, except Noss, where an increase was recorded. However, none of these changes were statistically significant. Large declines were reported at two colonies where complete counts were carried out: on Hermaness, 366 individuals represented a 41% decrease since the previous comparable count, in 2000 (Wilson 2004); on Noss, in contrast to the trend observed from sample plots, numbers fell since 2001 by 59%, to 813 (Sykes and Bliss 2004). In **Orkney**, a large proportional decrease occurred in sample plots on Papa Westray, although this change was not statistically significant and there were very few razorbills present in the plots. As in Shetland, declines were noted at two colonies monitored less than annually: the largest of these was at Marwick Head, where a whole colony count recorded 283 individuals, 60% fewer than in 1999. A decrease of 16% since 1999 was noted at Noup Cliffs, where 898 individuals were counted.

In **north-east Scotland**, where sample plots are monitored triennially, an overall decline of 14% was recorded. Between 2001 and 2004, numbers at Troup/Lions Head decreased significantly by 21% ($t=3.208$, $d.f.=8$, $P<0.01$), but there was no significant change at Fowlsheugh (-12%) and at Buller's of Buchan (-2%). Elsewhere, a large proportional increase was detected in the small colony at Sands of Forvie. Numbers in sample plots also declined in **south-east Scotland,** where a 29% fall at St Abb's Head continued a steep decline that started in 2002. However, elsewhere in the region whole-colony counts increased on the Bass Rock, and there was little or no change in the whole colony counts on the Isle of May and the Forth Islands. In **north-east England**, overall numbers appeared to be stable between 2003 and 2004 although the number of AOS in the small colony at Boulby fell by almost half.

Table 3.24.2 Population changes of razorbills 2003-2004 and 1986-2003 at selected sites referred to in the text. P\W indicates plot or whole-colony counts.

Region/Site		2003	2004	2003-2004 % change	1986-2003	
					Mean (±s.d.)	No. years
SW Scotland						
Lunga	W	1,247	2,064	+65.5	993 (320)	11
Mull of Galloway	W	393	461	+17.3	337 (103)	15
NW Scotland						
Handa	P	430	504	+18.4	516 (61)	6
Shetland						
Noss	P	47	57	+21.3	70 (15)	16
Hermaness	P	40	26	-35.0	59 (15)	16
Eshaness	P	50	42	-16.0	52 (16)	18
Troswick Ness	P	15	13	-13.3	18 (4)	18
Sumburgh Head	P	167	144	-13.8	212 (35)	18
Burravoe	P	11	11	0.0	12 (4)	13
Fair Isle	P	70	58	-17.1	68 (3)	5
Orkney						
Papa Westray	P	26	22	-15.4	60 (49)	2
NE Scotland						
Sands of Forvie	W	21	35	+66.7	30 (9)	7
SE Scotland						
Forth Islands (sites)	W	430	436	+1.4	350 (88)	8
Isle of May	W	3,105	3,313	+6.7	3,007 (818)	18
Bass Rock	W	89	158	+77.5	123 (59)	8
St Abb's Head	P	151	107	-29.1	167 (21)	15
NE England						
Farne Islands	W	222	224	+0.9	176 (32)	9
Boulby Cliffs	W	22	12	-45.5	12 (6)	6
SW England						
St Aldhelm's - Durlston	W	40	43	+7.5	22 (11)	8
Wales						
Caldey	W	33	38	+15.2	32 (28)	10
Elegug Stacks	P	431	402	-6.7	303 (80)	16
	W	738	678	-8.1	611 (117)	11
Stackpole Head	P	49	45	-8.2	65 (10)	8
	W	72	93	+29.2	125 (60)	11
Skokholm	P	151	166	+9.9	151	1
	W	1,103	1,192	+8.1	1002 (169)	12
Skomer	P	1,096	1,131	+3.2	830 (213)	17
	W	4,242	4,546	+7.2	3372 (702)	18
South Stack	P	792	802	+1.3	527 (112)	18
St Margaret's Island	W	120	120	0.0	133 (62)	12
NW England						
St Bee's Head	W	277	262	-5.4	238 (49)	16
NE Ireland						
Isle of Muck	W	872	573	-34.3	546 (249)	5

On Handa, the only razorbill colony monitored annually in **north-west Scotland,** numbers in sample plots increased but not significantly. A similar percentage increase was noted in **south-west Scotland,** albeit from whole colony counts, where a moderate increase was noted at Mull of Galloway. Elsewhere in this region, a large increase was noted on Lunga but counts there are carried out in late June/early July so the observed increase may just be an artefact of differences in the timing of the breeding seasons in 2003 and 2004. In **Wales**, numbers in sample plots and in whole-colonies indicated minimal or no change had occurred between 2003 and 2004. Monitoring of sample plots at Elegug Stacks, Stackpole Head, Skokholm, Skomer and South Stack recorded proportionally small changes and consequently none were statistically significant. Complete counts at some of these

colonies found changes were of similar magnitude to that recorded in plots, except at Stackpole Head where a large increase occurred, opposite to the small decrease noted in sample plots there. The regional trend has generally been upward but shows signs of levelling off in recent years. In **north-west England**, at St Bee's Head, a whole colony count indicated little change in numbers between 2003 and 2004.

A decline was noted in **north-east Ireland**, where numbers on the Isle of Muck had fallen by 34% since 2003. A large increase was also noted on Lambay (**south-east Ireland**), where numbers increased by 31% to 5,685 individuals since 1999.

Breeding success (Table 3.24.3)

It should be noted that the intensity of monitoring at the colonies listed in Table 3.24.2 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 six colonies monitored in 2004 (0.50 chicks per pair, s.e. ±0.12) was markedly lower than the long-term (1986-2003) mean of 0.68 (s.e. ±0.01) recorded from between one and six colonies annually. Comparison of the mean productivity across five colonies monitored in both 2003 and 2004 showed non-significant change overall, but there was much more variation between colonies in 2004 than there was in 2003. Productivity at three of these colonies changed little between 2003 and 2004, with the greatest changes occurring on Fair Isle (Shetland) and at North Sutor (north Scotland).

Table 3.24.3 Razorbill breeding success, 2003-2004 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 1986-2003**			**2003 chicks fledged/pair**			**2004 chicks fledged/pair**			**2003-2004 change**	
	Years	**Mean**	**±s.e.**	**Sites[n]**	**Mean**	**±s.e.**	**Sites[n]**	**Mean**	**±s.e.**	**Mean**	**±s.e.**
Fair Isle	13	0.60	±0.03	101[1]	0.43	-	84[1]	0.00	-	-0.43	-
Papa Westray				-	-	-	17[1]	0.35	-	-	-
North Sutor	7	0.75	±0.04	14[1]	0.71	-	18[1]	0.89	-	+0.18	-
Isle of May	18	0.68	±0.02	177[4]	0.59	±0.02	190[4]	0.54	±0.05	-0.05	-
Farnes	8	0.66	±0.05	53[1]	0.72	-	30[1]	0.70	-	-0.02	-
Skomer	11	0.57	±0.03	358[5]	0.48	±0.04	386[4]	0.52	±0.02	+0.04	-
Total [no. colonies]	-	-	-	703[5]	**0.59**	±0.06	722[6]	**0.50**	±0.12	**-0.06[5]**	±0.10

In 2004, productivity was especially low in the Northern Isles: birds on Fair Isle (**Shetland**) failed completely, and low success was reported on Papa Westray (**Orkney**). At the former colony, although the number of eggs laid in the study plot (84) was the lowest since 1999 hatching success appeared to be high, at 83% (*cf.* 48% for common guillemot at the same site). Food samples indicated that although razorbills did manage to find sandeels the fish caught were smaller than in previous years (Shaw *et al.* 2004). Colonies to the south of these were more successful: at North Sutor (**north Scotland**) breeding success was the highest on record and success was also relatively high at the Farne Islands (**north-east England**). Situated between these two colonies, productivity on the Isle of May (**south-east Scotland**) at 0.54 chicks per pair was below average; only in 1999 (0.52) has breeding success been lower at this site. Productivity was reduced through losses at the egg stage but, unlike guillemots, razorbills there appeared to find sufficient food and adult attendance was normal. The timing of breeding was normal and no unattended chicks were noted, suggesting that razorbills found food more readily, although in contrast to all previous seasons, when sandeels were the main prey, 74% of the loads of fish brought to chicks consisted of clupeids (more than twice the previous highest annual proportion). Fledging success was also high: 82% of those that hatched went on to fledge. On Skomer (**Wales**), breeding success was similar to 2003 and below the long-term mean (Brown and Morgan 2004).

3.25 Black guillemot *Cepphus grylle*

Numbers of pre-breeding adults recorded in Shetland were stable between 2003 and 2004, although numbers have declined since 2000. In Orkney, there was a large increase in numbers compared to 2003, although a decline is evident over the long-term. Available data indicated it was a moderately productive breeding season at most sites, although fewer chicks were fledged than in 2003.

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**, numbers decreased slightly along 13 stretches of coast monitored in 2003 and 2004. A larger sample, covering 14 stretches previously surveyed in 2000, suggested that numbers fell by 17%, from 2,249 birds to 1,856 (Heubeck 2004). Over this latter period, declines exceeding 30% were recorded on Mousa (195 individuals to 134) and Fair Isle (173 to 115) with lesser, but still substantial, decreases approaching 25% at Lunning (97 to 73), Kirkabister (190 to 147) and on Noss (112 to 85). However, the long-term trend suggests that the black guillemot population has remained stable since 1985, bar the fall recorded between 2000 and 2001. No monitoring was carried out in Yell Sound in 2004, where numbers had previously increased since 1985 (Mavor *et al.* 2003).

Table 3.25.1 Population changes at monitored black guillemot colonies, 2003-2004. 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	2003	2004	2003-2004 % change	% annual change
Shetland				
Shetland excl. Yell Sound	1,800	1,722	-4.3	-0.5 n.s. 1985-2003
Orkney[b]	656	826	+25.9	-4.1*** 1983-2003

Colonies: [a] Fetlar (east coast), Lunning, Levaneap, Noss (north coast), Kirkabister, Aithsetter, West Burra, Kettla Ness, Boddam-Virkie, Hillswick, Tingon (east), Foula (east coast), Fair Isle (east coast); [b] North Hill, Holm of Papa Westray, North Ronaldsay.

In **Orkney**, a large increase in numbers was observed between 2003 and 2004, in contrast to the general downward trend since 1983. Numbers on Papa Westray changed little between 2003 and 2004, decreasing from 303 individuals to 290 but a large of increase of 52% occurred on North Ronaldsay where 536 individuals were recorded in 2004. However, numbers recorded at this colony have fluctuated markedly since 1999, when 377 individuals were counted, with inter-annual changes of +26%, -16%, +25% and -29% respectively up to 2003.

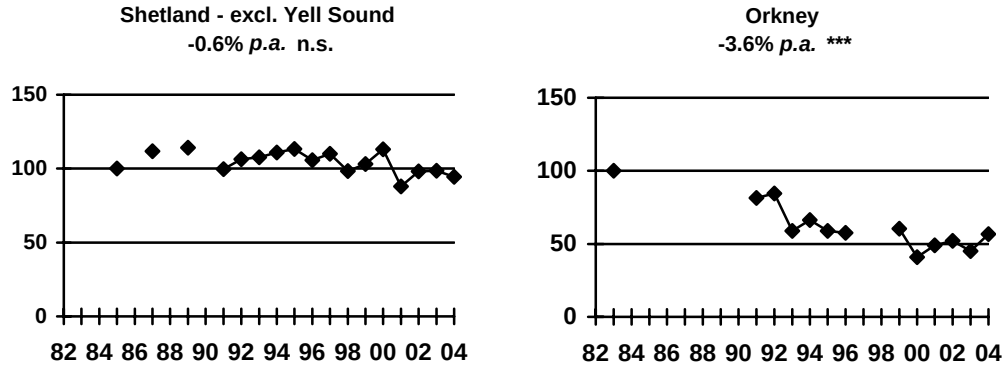

Figure 3.25.1 Regional population indices for breeding black guillemots, 1983-2004. Based on counts of adults in breeding habitat late March-early May. Average annual rates of change were calculated by regression of natural log of index against year (see section 1.2.2. for details). Statistical significance of trends indicated as: n.s, not significant; *** P<0.001.

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 19 sites. A surprisingly high number (36 adults) was found at Eilean Aoghainn (Loch Fyne) in early June (Craik 2004), which has suffered from mink predation in recent years, suggesting that recent previous counts of black guillemot here were underestimates (e.g. 2 in 2002, 5 in 2000).

Breeding success (Table 3.25.2)

In **Orkney**, breeding success was above average at North Ronaldsay although at other nests not followed as closely there were signs of predation by cats *Felis catus*. Success was below average on Auskerry and Swona, with both sites less successful than in 2003, although at the latter site the outcome of a further five nests, from which young possibly fledged, was unknown.

Table 3.25.2 Breeding success of black guillemots, 2003-2004 and 1986-2003. 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	2003	2004	1986-2003 mean	
			Mean (±s.e.)	No. of years
Orkney				
North Ronaldsay	1.53 (30)	≤1.50 (10)	1.41 (0.13)	8
Auskerry	1.24 (33)	1.12 (32)	1.32 (0.06)	9
Swona	1.38 (13)	1.29 (7)	1.60 (0.11)	3
NE Ireland				
Old Lighthouse Island	1.53 (19)	*c.*1.26 (25)	1.05 (0.08)	14
SE Ireland				
Rockabill	1.32 (41)	1.16 (49)	1.19 (0.04)	6

Similarly, two sites monitored in Ireland were also less successful than in 2003. On Old Lighthouse Island (**north-east Ireland**), productivity was 1.26 young from 25 nests (with the outcome unknown at a further three nests). On Rockabill (**south-east Ireland**), productivity was close to average. 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.

3.26 Atlantic puffin *Fratercula arctica*

Few puffin colonies were surveyed in 2004. Counts of apparently occupied burrows indicated that numbers increased on Coquet Island (NE England), Lunga (SW England) and Ynys Gwylan Fawr (Wales) since 2003. However, the observed increases at some colonies may be due to low attendance in 2003. Spring counts of adults ashore provided an estimate of colony size at several other sites. Breeding success was lower than in 2003 at all studied colonies, mainly due to food shortages, but severe wet weather also flooded many burrows on The Isle of May and the Farne Islands.

Breeding numbers

Few population data were collected in 2004. On Coquet (**north-east England**), there was a slight recovery in the number of AOBs following the large decline recorded between 2002 and 2003. Numbers had fallen by 40% from 18,729 AOB to 11,292 AOB over that period but increased to 12,075 AOB in 2004. On Lunga (**south-west Scotland**), the population was estimated at 1,533 AOB plus 1,254 individuals. Combining units, assuming that one individual corresponds to one AOB (Lloyd *et al.* 1991, Mitchell *et al.* 2004) this would suggest a population of 2,787 AOB. This is *c.*30% higher than figures obtained in 2001 (2,146 AOB) and 2002 (2,136 AOB), and would also represent a substantial recovery since 2003, when the population was estimated at 1,154 AOB. On Ynys Gwylan Fawr (**Wales**), 689 AOB were counted, compared with 307 in 2003, an increase of 124% (Stansfield 2004). However, the low figures recorded on Lunga and Ynys Gwylan Fawr in 2003 were probably due to low attendance by puffins in that year, rather than genuine declines in the number of potential breeders. In contrast, the decrease in numbers on Coquet probably represents a more sustained emigration of breeders from the colony.

Spring counts of individuals ashore prior to egg-laying, which provides a broad indication of colony size (Walsh *et al.* 1995), were carried out at several colonies. Numbers on Handa (**north-west Scotland**) decreased by 32% to 320 individuals but increases were recorded in **Wales**; on Skomer numbers rose by 25% to 10,688, with a small increase of 3% noted on Skokholm (4,308). All changes occurred since 2003. Dividing spring counts by 1.5 to provide an estimation of AOB (Lloyd *et al.* 1991, Mitchell *et al.* 2004) would indicate populations for the three colonies of 213, 7,125 and 2,872 AOB, respectively, in 2004.

On Lambay (**south-east Ireland**), 209 individuals were counted ashore in June compared to 265 in 1999 (S. Newton, pers. comm.).

Breeding success (Table 3.26.1)

Atlantic puffins had a less successful breeding season in 2004; productivity was less than in 2003 at all sites and consequently overall success was below the long-term mean of 0.72 (s.e. $\pm$0.04) recorded at two to seven colonies monitored annually from 1986-2003.

On Fair Isle (**Shetland**), breeding success was similar to that recorded in 2003 but, in contrast to other auk species on the island, Atlantic puffins were comparatively successful, mainly because they appeared to find food more readily than the other auks. Samples collected were few, but contained a high percentage of sandeels. However, the mean weight of loads brought to chicks was at its lowest since recording began in

1986 and the average size of sandeels caught was around 32mm, half the long-term mean of 74mm for 1988-2003 (Shaw *et al.* 2004). Feeding watches indicated the number of visits being made to chicks in 2004 (6.6 feeds per burrow per day) was above average (1995-2003 mean, 5.3) suggesting adults found an adequate food supply, albeit perhaps one of low quality compared with other years.

On the Isle of May (**south-east Scotland**), breeding success was one of the lowest ever recorded; in part this was due to burrows being flooded during severe weather in late June but chicks also grew poorly, suggesting feeding conditions were bad. Sandeels made up 92% by number and 86% by weight of the diet of young Atlantic puffins, however, the mean load size of 6.3g was below the long-term average (9.2 g) although in contrast the number of fish per load (14.9) was twice the long term average (6.7) (Harris *et al.* 2004). Flooding also affected Atlantic puffins nesting on the Farne Islands (**north-east England**), where productivity was the lowest recorded since 1998, with birds on the Inner Farnes almost twice as successful as those on the Outer Farnes, where many burrows were flooded in severe weather during June. Feeding observations again suggested birds were less affected by the low availability of food that affected other species, switching readily from sandeels to sprats and young herring (Walton 2004).

Table 3.26.2 Atlantic puffin breeding success, 2003-2004. Estimated number of chicks fledged per egg or occupied burrow (Welsh colonies). Superscript indicates number of colonies.

Colony	**2003 chicks fledged/pair**				**2004 chicks fledged/pair**				**2003-2004 change**	
	Burrows	**Range**	**Mean**	**±s.e.**	**Burrows**	**Range**	**Mean**	**±s.e.**	**Mean**	**±s.e.**
Fair Isle	55	-	0.65	-	40	-	0.63	-	-0.02	-
Isle of May	195	-	0.77	-	196	-	0.60	-	-0.17	-
Farne Islands	100	-	0.89	-	100	-	0.62	-	-0.27	-
Skomer	87	-	0.78	-	121	-	0.63	-	-0.15	-
Total	437[4]	0.65-0.89	**0.77**	±0.05	457[4]	0.60-0.63	**0.62**	±0.01	**-0.15**[4]	±0.05

In **Wales**, breeding success on Skomer appeared to be the lowest on record. However, the breeding season was thought to be early, with the first adults recorded with fish on 24 May. The emergence of many large chicks from burrows throughout two 24 hour watches in late June/early July suggested the season was well advanced, so some birds may have already fledged, which could account for the relatively low fledging rate (Perrins 2004).

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