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**Seabird numbers and breeding success  
in Britain and Ireland, 2002**

R.A. Mavor, M. Parsons, M. Heubeck, G. Pickerell and S. Schmitt

Roddy Mavor and Matt Parsons, Seabirds and Cetaceans,  
Joint Nature Conservation Committee, Dunnet House, 7 Thistle Place, Aberdeen, AB10 1UZ

Martin Heubeck, Shetland Oil Terminal Environmental Advisory Group,  
Department of Zoology, University of Aberdeen, Tillydrone Avenue, Aberdeen, AB9 2TN

Georgina Pickerell, 4, Sandy Road, Willington, Bedfordshire

Sabine Schmitt, Research Department, Royal Society for the Protection of Birds,  
The Lodge, Sandy, Bedfordshire, SG19 2DL

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## Summary

This report presents the results of monitoring of seabird populations and breeding performance throughout Britain and Ireland in 2002 and makes comparisons with previous years. The report is produced annually as part of the JNCC's Seabird Monitoring Programme, in collaboration with the Royal Society for the Protection of Birds (RSPB) and the Shetland Oil Terminal Environmental Advisory Group (SOTEAG). Some findings of particular note in 2002 are summarised below:

- Numbers of breeding **red-throated divers** were similar to those recorded in 2001. Breeding success in Shetland was higher than in 2001, while in Orkney it was lower than in 2001; in both regions success was above the long term average.
- Few data were received on **Manx shearwater** in 2002. Breeding success on Rum was the highest since 1997, while further confirmation was obtained of the species' demise on Canna. Productivity was high on Bardsey but again low on Skomer (although around average for the colony).
- Numbers of **European shag** nests generally increased or remained stable in 2002, compared with 2001, except in Shetland, north-west Scotland and north-east England, where numbers at monitored colonies declined. The important colony on Canna was smaller than at any time since 1986 and productivity there was low. Fair Isle, Isle of May and Bardsey recorded their most productive seasons, Sumburgh Head its second most productive.
- The recorded number of breeding **Mediterranean gull** fell between 2001 and 2002, due partly to an incomplete count of one of the larger colonies and to a high proportion of non-breeding at the large Langstone Harbour colony, probably caused by low food availability. The species bred successfully in Northern Ireland for the first time.
- An ongoing study in western Scotland provided further information on the effect of mink predation on the productivity of gulls: breeding success was reduced by a mean of 44% in **herring gulls** and 57% in **mew gulls** over the last 6-7 years
- Surveys of several large colonies of **Atlantic puffin** were undertaken in 2002. Numbers declined at Hermaness, increased on Coquet and remained stable on North Rona and Lunga (compared with surveys in 1997, 2001, 1993 and 2001, respectively). Successful breeding was confirmed on Ailsa Craig for the first time in decades following the eradication of rats in the early 1990s.
- As in 2001, several species in Shetland had a poor breeding season in 2002, largely attributed to reduced availability of sandeels, although food appeared to be abundant for Orkney breeders. Both **great skua** and **Arctic skua** numbers declined (whereas in Orkney they increased) and productivity of great skuas on Fair Isle was the lowest on record and low at other Shetland colonies. Numbers of breeding **black-legged kittiwakes** continued to decline: the number within 18 colonies decreased by 39.6% between 1999 and 2002 and productivity was again low, with failures largely occurring at the egg stage. **Arctic terns** had a very unproductive season in 2002, yet birds on Orkney had their most successful season on record. Counts of **common guillemots** at study plots in Shetland (except Fair Isle) showed marked declines between 2001 and 2002 and the population index for the region was equal to the lowest recorded during the duration of the SMP. Productivity and weights of chicks at Sumburgh Head were low.

## 1 Introduction

This is the fourteenth 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 2002 are summarised and compared with results from previous years, primarily 2001, with an analysis of longer term trends in the context of recent findings. This edition of the report contains modest changes to the presentation of some of the information, which it is hoped will improve the readability of the report and assist in understanding the data; a description of the changes is given in section 1.2.5.

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 seasons, would be greatly appreciated by the authors. We are also keen to receive any existing additional information on numbers or breeding success for any seabird species, whether at coastal or inland colonies, which may not have been previously submitted to the Seabird Monitoring Programme. Any such data will be added to the long-term seabird databases maintained by JNCC and RSPB, including the JNCC/Seabird Group's 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 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 on Orkney Mainland, on St Kilda (north-west Scotland) and in Grampian (north-east Scotland). 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. Population changes since the previous complete survey (the Seabird Group's Operation Seafarer in 1969-70) are summarised in Table 1.1.1. A repeat complete census of British and Irish seabird colonies, Seabird 2000 (running from 1998-2002), has recently been completed and is due for publication in April 2004. 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).

## **1.2 Data presentation and methods**

Some potential limitations of the information presented are outlined below, followed by a description of changes made to the presentation of the data in this year's edition of the report. 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 2001 and 2002. 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.

**Table 1.1.1** Counts or estimates of total breeding populations of seabirds in Britain and Ireland.

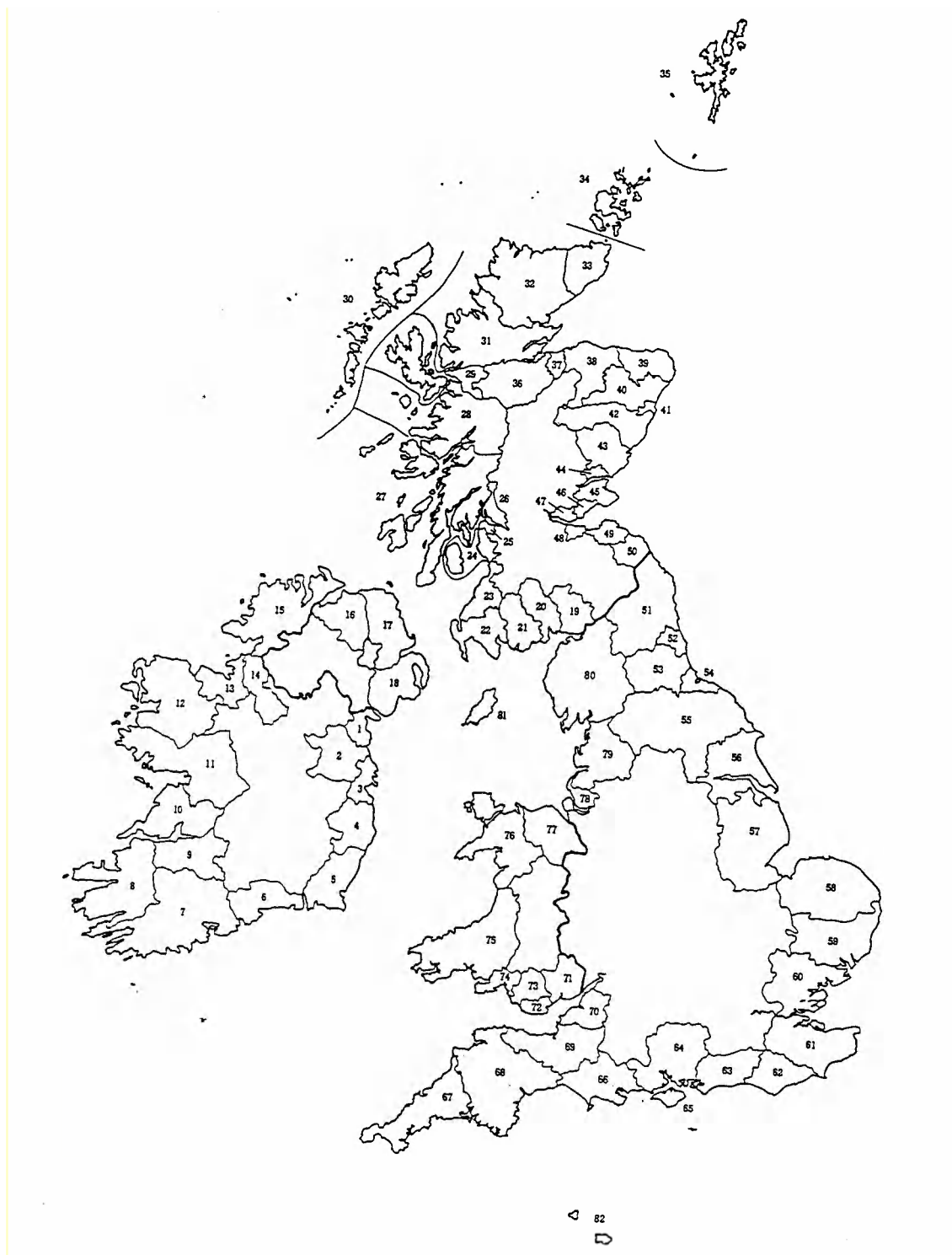
Most figures are for 1985-87 (Lloyd *et al.* 1991) but those for northern gannet, skuas, Mediterranean gull, roseate tern and Arctic tern include more recent updates. Data from the Seabird 2000 census has not been used for most species as some figures had not been finalised at time of going to press, but will appear in future editions. Figures for Britain excludes the Isle of Man and the Channel Islands (included under Britain and Ireland). For population estimates for Great Britain (excluding the Isle of Man) and UK (GB plus Northern Ireland) see Stone *et al.* (1997). Units are 'pairs' for most species (apparently occupied nests/sites or, for skuas, territories), with the exception of auks, for which units are individual birds ('i' in table).

	Coastal population		% change <sup>2</sup>	Total population <sup>3</sup>	
	Britain	Britain and Ireland <sup>1</sup>		Britain	Britain and Ireland <sup>1</sup>
Northern fulmar	537,000	571,000	+85%	537,000	571,000
Manx shearwater <sup>4</sup>	c. 235,000	c. 275,000	?	c. 235,000	c. 275,000
European storm-petrel	41+ colonies	72+ colonies	?	41+ cols.	72+ cols.
Leach's storm-petrel	6+ colonies	7+ colonies	?	6+ cols.	7+ cols.
Northern gannet <sup>5</sup>	207,300	243,500	+36%	207,300	243,500
Great cormorant	6,000	10,400	+30%	6,800	11,700
European shag	36,400	47,300	+40%	36,400	47,300
Arctic skua <sup>6</sup>	3,100	3,100	≤ +220%	3,100	3,100
Great skua <sup>6</sup>	8,800	8,800	≤ +150%	8,800	8,800
Mediterranean gull <sup>7</sup>	83	84	≥ +200%	83	84
Black-headed gull	77,300	84,200	+13%	167,000	233,000
Mew gull	14,800	15,700	+21%	67,800	71,400
Lesser black-backed gull	62,300	65,700	+31%	82,300	88,700
Herring gull	135,000	191,000	-43%	150,000	206,000
Great black-backed gull	18,300	23,300	+3%	18,400	23,400
Black-legged kittiwake	492,000	544,000	+22%	492,000	544,000
Sandwich tern	14,000	18,400	+53%	14,000	18,600
Roseate tern <sup>8</sup>	68	758	-80%	68	758
Common tern	11,800	14,700	-1%	12,700	16,000
Arctic tern <sup>9</sup>	42,400	44,900	-14%	42,900	45,500
Little tern	2,400	2,800	+40%	2,400	2,800
Common guillemot	1,047,000i	1,203,000i	+118%	1,047,000i	1,203,000i
Razorbill	147,000i	182,000i	Probably +	147,000i	182,000i
Black guillemot	37,500i	40,500i	Probably +	37,500i	40,500i
Atlantic puffin <sup>10</sup>	898,000i	940,000i	Slightly +?	898,000i	940,000i

## Notes:

- Irish figures include some estimates (mainly for northern fulmar, European shag and gulls) for coastal sections, which had not been surveyed by 1988.
- Net change based on comparison with total recorded during the 1969-70 'Operation Seafarer' survey (reanalysis of counts summarised by Cramp *et al.* 1974); differences in count methods prevent direct comparison for some species.
- British and Irish totals for some species include estimates of inland populations.
- Manx shearwater figures are very approximate (midpoints of population estimates).
- Northern gannet figures are from a complete survey of North Atlantic colonies carried out in 1994 and 1995 (Murray and Wanless 1997) with updates for colonies counted subsequently.
- Skua figures are from the 1992 surveys of Orkney and Shetland (Meek *et al.* 1994; Sears *et al.* 1995), with a 1996 update for Hoy (Furness 1997), otherwise 1985-87 with updates to 1996 for Handa and St Kilda. Although some nest inland in mainland Scotland, all are treated as coastal here.
- Mediterranean gull figures are updated for 2001 only (2002 count known to be an underestimate). Figures from *Seabird 2000* counts.
- Roseate tern figures are from 2002 (this report).
- Arctic tern figures include Shetland and Orkney counts from the 1989 RSPB survey (Avery *et al.* 1993), with counts of individuals divided by 1.5 to give an estimate of pairs.
- Atlantic puffin figures are very approximate, and include a high proportion of counts of pairs multiplied by 2 to give estimates of numbers of individuals.





**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. Reproduced, with permission, from Lloyd *et al.* (1991).

**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), Gloucestershire, 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

### 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).

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 (Wilkinson 1990). 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, e.g. between 1969-70 and 1985-87 (Lloyd *et al.* 1991), there is inevitably some loss of count accuracy at the expense of obtaining complete geographical coverage. However, 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 source of 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.

### *1.2.5 Changes to data presentation included in this edition of the report*

Following an interim review of the presentation of data in the annual report, the following changes and additions have been incorporated in this edition. It is hoped that these changes will enhance the readability and ease of understanding of the data.

- A short summary is included at the start of each of the species chapters, highlighting significant findings in the context of previous year's data.
- New tables have been introduced in some species accounts (one each for breeding numbers and breeding success) that tabulate data for the colonies mentioned in the text. This has allowed us to move cumbersome listings of figures from the text, thus improving readability.
- The text now includes a fuller discussion of how the current year's data fits into the context of not just the previous year or few years, but the longer term.

## **2 General features of the 2002 breeding season**

Generally, weather conditions for breeding seabirds in 2002 appeared to be less than wholly benign, with western Britain having had a particularly wet June, and July being very wet throughout. April was generally dry and warm in most regions, apart from the end of the month when low pressure brought much cooler weather with wind and rain. The first part of May in western Britain was largely settled, while in eastern areas the north-easterly wind kept conditions cool and cloudy. A brief spell of very warm weather in mid month was ended with rain and thunderstorms in places. The last two weeks of May were very unsettled with much wind and rain, although north-east Scotland escaped most of the rain. June was generally very wet in the west and dry in the south and east. Shetland fared better than most regions with much sunny weather; Lerwick had its warmest June since records began there in 1911. July was the wettest since 1988, with low pressure dominating for much of the month. It was cool and very unsettled with much rain until mid month. July ended with very warm weather, followed by some severe thunderstorms and flooding.

The 2002 season was reported to be slightly earlier than average for some species, perhaps due to the warm weather that prevailed early in the season, but with some sites reporting a late season. For example, on the Isle of May European shags and black-legged kittiwakes laid their first egg on 16 April and 10 May, respectively (Wilson *et al.* 2002). On Canna, European shags had an early breeding season in 2002, with only 7% of nests having eggs in early July, compared to 11% in 2001, 14% in 2000, 12% in 1999, 19% in 1998 and 24% in 1997. Also on Canna, common guillemots and razorbills were earlier than usual (Swann 2002). In contrast, on Shetland black-legged kittiwakes at Noss NNR were late, with the first eggs not confirmed until 26 May (Gabb & Thomas 2002), as were many species on Foula (Furness 2002) but elsewhere on Shetland, razorbills, common guillemots European shags and great cormorants had an early season - the lattermost species exceptionally so (Okill 2002).

On Skomer lesser black-backed gulls had a very unproductive season, continuing a run of similar seasons in recent years. While low food availability has been cited as a probable causal factor in past years, the poor weather in May could have been a contributing factor in 2002 (Perrins 2002). On Ailsa Craig, a large number of failed nests of Northern gannet and black-legged kittiwakes was attributed to heavy rain and strong winds in June (B. Zonfrillo pers. comm.).

The 2002 breeding season in Shetland was apparently severely affected by low availability of sandeels *Ammodytes* spp. in the early part of the season (Heubeck 2003, Furness 2002). On Fair Isle, many of those species that rely heavily on sandeels for food - kittiwake, Arctic skua, arctic tern, and great skua - experienced poor productivity, the latter two species particularly so (though great skua is less reliant

on sandeels). Losses of arctic terns mainly occurred at the egg stage, although many pairs failed even to build a nest (Shaw *et al.* 2002). Black-legged kittiwakes on Shetland experienced a high degree of early failures and non breeding, although those birds that continued to incubate were fairly successful, perhaps indicating increased food availability later in the season (M. Heubeck, pers. comm.). The apparent food shortage in Shetland was not universal, however, as arctic terns on Fetlar had their most successful season for over a decade (Smith and Bellamy 2003). In marked contrast to most of Shetland, in the feeding areas around Orkney, sandeel availability was apparently high, with arctic terns and black-legged kittiwakes successfully raising good numbers of chicks (Meek 2002). On the Isle of May, in south-east Scotland, black-legged kittiwakes (and, to a lesser extent, razorbills) suffered high losses during incubation, apparently due to birds being in poor condition (Wilson *et al.* 2002). However, European shags on the Isle of May (and on Fair Isle) had a particularly successful season in 2002 (Wilson *et al.* 2002), and this species feeds on larger classes of sandeels in inshore waters, unlike the black-legged kittiwake, which feeds offshore on the young age-classes of fish.

On the Isle of May the IMPRESS project was initiated in 2001 to investigate the relative importance of climate, hydrography and fishing pressure and their affects upon the availability of prey to seabirds. This continued in 2002, a year of poor weather which should add useful data to help our understanding of these relationships (Wilson *et al.* 2002).

The access restrictions imposed by the outbreak of foot and mouth disease in 2001 led to some colonies being unsurveyed in that year – see Mavor *et al.* (2002) for details. This has meant that some comparisons between 2001 and 2002 were not possible, and details are given in the text.

### 3. Species accounts

Nomenclature follows *Checklist of Birds of Britain and Ireland* (British Ornithologists Union 1992) and subsequent relevant BOURC updates published in the journal *Ibis*.

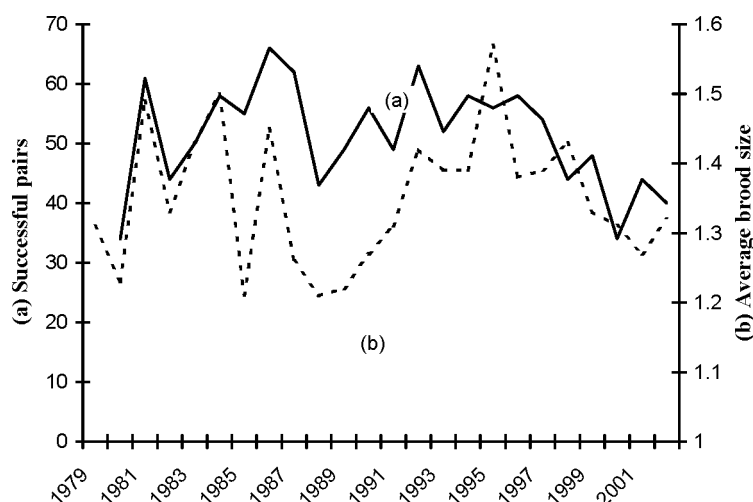
#### 3.1 Red-throated diver *Gavia stellata*

*In all regions breeding numbers of red-throated divers were similar to those recorded in 2001. In Shetland, the species had a more successful breeding season than in 2001 at all reporting colonies. In contrast, productivity on Orkney was lower than in 2001 at all colonies. However, in both regions overall breeding success in 2002 was above the long-term mean. In north-west Scotland, productivity was high on Handa, but on Eigg no young fledged for the third successive year.*

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

In **Shetland**, overall productivity improved on that recorded in 2001, measuring 0.71 chicks fledged per pair, the highest regional total since 1995 and well above the long-term average of 0.58 (s.e.  $\pm 0.04$ ). Between 2001 and 2002, mean breeding success increased at all study areas. On Fetlar, productivity was the highest recorded since monitoring began with 22 chicks fledging from 24 pairs (Smith and Bellamy 2002). Divers also had a successful year at Hermaness, where productivity almost doubled compared to 2001 although productivity was still below the colony long-term average. On Foula, productivity was at its highest level since 1996 but remained below average (S. Gear, pers. comm.).

Four areas were again monitored by the Shetland Ringing Group. The timing of the breeding season was near normal as in 2001, with high water levels in the study lochs after a wet winter and an early spring (Okill 2001a). The number of successful pairs (defined as pairs with chicks in July) dropped slightly compared to 2001, from 44 down to 40, remaining below average for the period 1980 to 2001 (51.7, s.d.  $\pm 8.75$ ). The number of pairs that raised two chick broods increased between 2001 and 2002, with mean brood size at fledging totalling 1.32, although this was still below the mean for the period 1979 to 2001 (1.35, s.e.  $\pm 0.02$ ).



**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), 1979-2002. Data are from Okill (2002a).

Two pairs of divers again nested on artificial sites first provided in 2001, situated at reservoirs where falling water levels had previously caused nesting divers to fail; one a specially constructed island, the other a man-made raft. Only the pair nesting on the island was successful, fledging a single chick, while the pair occupying the latter site did not nest due to disturbance from prolonged, strong south-easterly winds which destabilised the raft.

In contrast, red-throated divers on **Orkney** had a less successful breeding season than in 2001. Eighty-one monitored sites fledging an average of 0.62 chicks per site and although this was above the overall long-term average of 0.54 (s.e.  $\pm 0.03$ ) breeding success in each area actually declined compared to 2001 figures. On the Orkney Mainland, 12 monitored pairs fledged 0.67 chicks per pair, the lowest value recorded since 1996 but still above the long-term mean (Meek 2002). At another site, four pairs all hatched chicks but fledging success was unknown. On Hoy, productivity was also above average, but lower than in 2001. In total, 130 known sites were checked, with 63 of these occupied from which a total of 41 young fledged. On Rousay, four sites held six pairs but only one of these reared a single chick.

**Table 3.1.1** Red-throated diver breeding success, 1986-2002: figures are estimated number of chicks fledged per breeding pair (Shetland, NW Scotland) or occupied site (Orkney). Note that numbers of pairs do not necessarily indicate total populations in study areas. Figures for Handa and Rum in 2001 are not included in the 1986-2001 mean.

Region/site	2001		2002		1986-2001	
					mean (+s.e.)	No. of years
<b>Shetland</b>						
Hermaness	7	0.43	6	0.83	0.95 (+0.09)	16
Fetlar	23	0.48	24	0.92	0.49 (+0.05)	16
Yell	8	0.25	11	0.45	0.59 (+0.08)	13
Foula	11	0.36	10	0.40	0.44 (+0.06)	16
Sample total	49	0.41	51	0.71	0.58 (+0.04)	14
<b>Orkney</b>						
Hoy	65	0.72	63	0.65	0.56 (+0.03)	13
Rousay	1	1.00	6	0.17	0.32 (+0.13)	11
Mainland	19	1.11	12	0.67	0.60 (+0.08)	13
Sample total	85	0.81	81	0.62	0.54 (+0.04)	13
<b>NW Scotland</b>						
Handa	4	0.00-1.50	4	1.25	1.23 (+0.10)	15
Eigg	3	0.00	1	0.00	0.85 (+0.15)	16
Rum	8	0.00-0.25	-	-	0.62 (+0.06)	15

Outside the Northern Isles, the few data that were available for 2002 came from **north-west Scotland**. On Handa, four pairs again nested and overall productivity was close to the long-term mean. Two pairs fledged two chicks each, with one pair fledging one chick and no young seen at the fourth site (Stoneman and Williams 2002). On Eigg, only one pair nested but the eggs were depredated by an otter *Lutra lutra* when near to hatching (J. Chester, pers. comm.). No monitoring was carried out on Rum (**south-west Scotland**).

### 3.2 Northern fulmar *Fulmarus glacialis*

*Mainly small regional changes in the number of northern fulmars occurred between 2001 and 2002, apart from at the single monitored colony in north-east Scotland – Forvie - which decreased by 26.9%, and in north-east England, which saw a 13% increase. However, much intra-regional variation occurred. The longer term trend in regional numbers is one of decline, stability or of levelling off in the rate of increase. Breeding success in 2002 was similar to that in 2001 in most regions (again, much intra-regional variation) but with increases in south-west Scotland and in Wales. Longer term regional trends are for increasing or stable breeding success, apart from in Shetland where there has generally been a decline.*

*Breeding numbers (Tables 3.2.1, 3.2.2 and 3.2.3; Figure 3.2.1)*

In **south-west Scotland** overall numbers in 2002 remained very similar to those in 2001 and 2000, following consecutive declines in the regional population index in the years 1997 to 2000. This conceals much variation, however, with Colonsay seeing a 23% increase over 2001 and Lunga seeing a 22% decrease in numbers (Ward 2002), the lowest count there since 1995, while numbers on Sanda were similar to those in 2001.

In **north-west Scotland**, a small overall decrease was recorded, compared with 2001, although at the monitoring plots on Handa (Stoneman and Williams 2002) a large and statistically significant decrease occurred between 2001 and 2002 (-13.8%,  $t=3.37$ , d.f.=10,  $P<0.01$ ). The regional decrease in 2002 is the seventh consecutive fall in numbers across the three (occasionally four) sites monitored, since the peak in the population index in 1995, taking the index to its lowest value in the period of the SMP.

In **Shetland**, decreases occurred at all four SOTEAG annual monitoring plots between 2001 and 2002 (Heubeck 2003), but statistically significantly so only at Troswick Ness (7.2% decrease,  $t=2.30$ , d.f.=8,  $P<0.05$ ). Non-significant decreases were recorded at Sumburgh Head, Burravoe, and Eshaness. In contrast, the number of AOS at the Noss productivity monitoring plots increased markedly. The regional population index shows a recent period of stability – and perhaps, for 2001 and 2002, initial signs of a decline - following modest increases between the early to mid 1990s.

In **north-east Scotland**, numbers at the Sands of Forvie in 2002 (Milne 2002) decreased by 26.9 % compared with 2001, to the lowest count there since 1991.

In **south-east Scotland**, overall numbers in 2002 across 11 sites increased by 5.6% compared with 2001, and the regional index shows signs of having stabilised, albeit at a fairly low level, after the marked decline between 1997 and 1998, and following increases between 1990 and 1997. Substantial increases occurred at St Abb's Head (Rideout and Beaumont 2002), Inchkeith and Fidra, compared with 2001, although a small decrease was recorded at Inchholm (Jones 2003).

Colonies in **Wales** experienced an overall small decrease in 2002, compared with 2001, although much variation between colonies occurred; the largest colony - Skomer - saw a 13% decrease (Brown and Duffield 2002) while Skokholm - the next largest - saw a 15% increase. The numbers at Stackpole Head with Elegug Stack coast was similar to that in 2001, as was the number on Bardsey (Stansfield 2002). The small colony at South Stack saw a three-fold increase on the 2001 count. A regression of the regional population index with time between 1986 and present shows a statistically significant mean annual increase of 2.0% *per annum*.

In **north-east England**, numbers on the Farnes returned to the (rather constant) level that has been seen there over the last decade, following the low number in 2001 (Walton 2002). The number on Coquet in 2002 was slightly higher than in 2001.

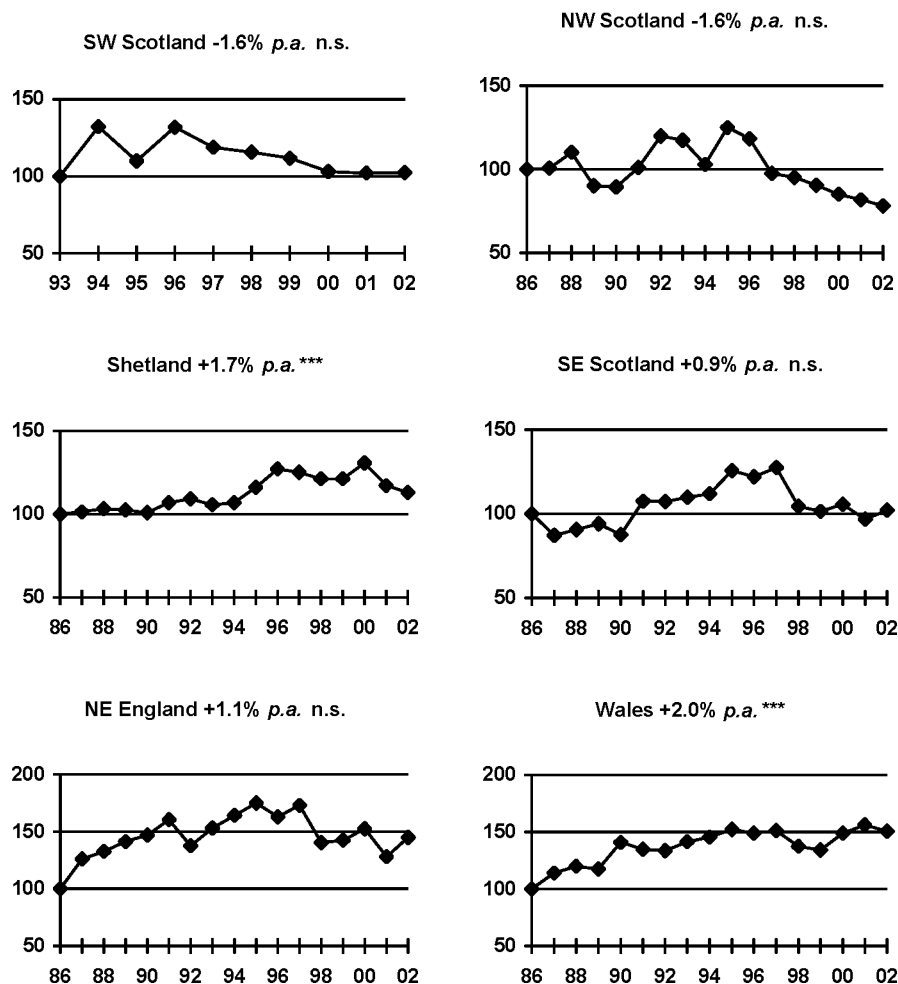


The small colony monitored in **north-west England** – Glen Maye Gorge - showed no change between 2001 and 2002. At St Bees 35 AOS was lower than the 51 AOS recorded in 2000, and well below the long term mean of 68 (s.d.= 22.1, n=14). In **south-west England**, the number at St Aldhelm's Head was half that of the 2001 count (Morrison 2002), while the Berry Head colony remained very small (8 AOS in 2001 and 2002).

**Table 3.2.1** Regional population changes at monitored northern fulmar colonies, 2001-2002 (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, \*\*\*  $P < 0.001$ . Further details of calculation of trends are given in section 1.2.2.

Region	2001	2002	2001-2002 % change	% annual change
SW Scotland <sup>a</sup>	1,568	1,576	+0.5 <sup>a</sup>	-1.6 n.s. 1993-2001
NW Scotland <sup>b</sup>	694	666	-4.0 <sup>b</sup>	+0.7 n.s. 1986-2001
Shetland <sup>c</sup>	2,664	2,573	-3.4 <sup>c</sup>	+1.7*** 1986-2001
NE Scotland <sup>d</sup>	297	217	-26.9 <sup>d</sup>	-
SE Scotland <sup>e</sup>	1,885	1,991	+5.6 <sup>e</sup>	+1.2 n.s. 1986-2001
NE England <sup>f</sup>	284	321	+13.0 <sup>f</sup>	+1.3 n.s. 1986-2001
Wales <sup>g</sup>	1,035	997	-3.7 <sup>g</sup>	+2.1*** 1986-2001

Colonies: <sup>a</sup> Mull of Galloway, Lunga (Treshnish Isles), Colonsay (sample areas), Sanda; <sup>b</sup> Canna, Eigg, Handa (plot counts); <sup>c</sup> Hermaness (productivity plot), Eshaness (plot counts), Burravoe (plot counts), Troswick Ness (plot counts), Sumburgh Head (plot counts), Fair Isle (productivity plots); <sup>d</sup> Sands of Forvie; <sup>e</sup> Isle of May, Inchkeith, Inchgarvie, Inchmickery, Inchcolm, Craigleith, Lamb, Fidra, Tantallon, Bass Rock; St Abb's Head; <sup>f</sup> Farne Islands, Coquet; <sup>g</sup> Stackpole Head plus Elegug Stacks and adjacent coastline, Skomer, Skokholm, Bardsey, South Stack..



**Figure 3.2.1** Regional population indices for breeding northern fulmars, 1986-2002 (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, \*\*\*  $P < 0.001$ .

#### *Breeding success* (Tables 3.2.3 and 3.2.4)

In 2002, overall productivity was similar to that recorded in 2001 averaging 0.42 chicks fledged per AOS across 31 colonies, and equal to the 1986-2001 mean.

On Ailsa Craig, in **south-west Scotland**, productivity increased somewhat in 2002, compared with 2001, to equal the long term mean, which represents high breeding success. In **north-west Scotland**, mean productivity in 2002 across three colonies was very similar to the mean for 2001, with Handa very slightly above the 2001 productivity (Stoneman and Williams 2002), while Canna (Swann 2002a) and St Kilda were slightly lower than in 2001, the latter well below the long term mean.

Overall, breeding performance on **Orkney** in 2002 was very similar to that recorded in 2001 and there was little variation between the constituent colonies, other than on Rousay, where productivity was markedly lower than the particularly successful season of 2001, and close to the long term mean. In **Shetland**, mean productivity across seven constituent colonies was marginally higher in 2002 than in

2001, but with marked variation between sites. Increases occurred at Westerwick, Sumburgh Head, Troswick Ness and Fair Isle. Decreases occurred at Hermaness and Noss, both colonies recording their lowest productivity during the course of the SMP.

At Easter Ross, **north Scotland**, productivity was very low in 2002 and well below the mean for 1994-2001. Indeed, this colony has been consistently unproductive. Elsewhere in the region, productivity at the colony near Wilkhaven was below the mean for 1995-1999, but no data for 2001 (nor 2000) was obtained.

**Table 3.2.2** Population changes of northern fulmar 2001-2002 and 1986-2001 at selected sites referred to in the text. PW indicates plot or whole-colony counts.

Region/Site		2001	2002	% Change 2001-2002	1986-2001 Mean ( $\pm$ s.d.)	No. of years
<b>SW Scotland</b>						
Colonsay	W	492	606	+23.2	602 (72)	10
Lunga	W	575	449	-21.9	559 (118)	6
Sanda	W	472	480	+1.7	384 (140)	13
<b>NW Scotland</b>						
Handa	P	103.3	89	-13.8	120 (15)	15
<b>Shetland</b>						
Troswick Ness	P	1134.2	1052.4	-7.2	991 (133)	16
Sumburgh Head	P	257.8	251	-2.6	238 (30)	12
Burravoe	P	178	165.2	-7.2	167 (28)	15
Eshaness	P	345.5	334	-3.2	376 (20)	6
Noss	P	208	268	+28.8	342 (98)	9
<b>NE Scotland</b>						
Sands of Forvie	W	297	217	-26.9	283 (51)	13
<b>SE Scotland</b>						
St Abb's Head	W	212	256	+20.8	322 (50)	16
Inchkeith	W	365	419	+14.8	467 (72)	15
Fidra	W	179	206	+15.1	204 (63)	16
Inchcolm	W	178	166	-6.7	190 (46)	11
<b>NE England</b>						
Farnes	W	226	254	+12.4	238 (28)	16
Coquet	W	58	67	+15.5	62 (11)	9
<b>SW England</b>						
St Aldheim's Head	W	41	20	-51.2	-	-
<b>Wales</b>						
Skomer	W	730	635	-13.0	656 (69)	16
Skokholm	W	153	176	+15.0	139 (18)	10
Stackpole Head and Elegug Stack	W	63	65	+3.2	78 (9)	5
Bardsey	W	45	43	-4.4	37 (9)	12
South Stack	W	16	51	+218.8	30 (13)	10
<b>NW England</b>						
Glen Maye Gorge	W	25	25	0.0	26 (6)	14

In **south-east Scotland**, overall breeding success in 2002 was marginally higher than it was in 2001, although there was much variation between colonies. The Isle of May had a moderately productive season, considerably higher than in 2001 (Wilson *et al.* 2002), and slightly above the long term average for the island. In contrast, Tantallon was extremely unproductive, far lower than in 2001 – itself an unproductive year. Breeding success at St Abb's Head (Rideout and Beaumont 2002) was moderate and slightly above that in 2001, though well above the (low) mean of seven recent years.

In **north-east England**, northern fulmars on the Farnes had the second most successful season in the 17 years of the SMP there, slightly higher than 2001 and well above the long term mean (Walton 2002).

On the **Isle of Man**, few colonies were counted in 2001 to provide comparison with 2002. At Bradda a moderate productivity was recorded, higher than in 2001 and well above the average for this site. Elsewhere, Traie Vane-Gob yn Ushtey and Glen Mooar – Gob y Deigan both saw low breeding success.

The mean productivity across sampled colonies in **Wales** was high in 2002, slightly above 2001. Particularly productive in 2002—as has often been the case - were birds at Bardsey, slightly more so than in 2001 (Stansfield 2002). The other colonies sampled – Skomer (Brown and Duffield 2002) and Skokholm – were more productive in 2002 than in 2001, though both were a little below the long term mean for these sites.

**Table 3.2.3.** Breeding success (chicks fledged per Apparently Occupied Site) of northern fulmar 2001-2002 and 1986-2001 at selected sites referred to in the text. Figures in parentheses under 2001 and 2002 are the number of occupied burrows from which success estimate was derived.

Region/site	2001	2002	1986-2001 mean ( $\pm$ s.e.)	No. of years
<b>SW Scotland</b>				
Ailsa Craig	0.50 (16)	0.71 (14)	0.71 (0.04)	10
<b>NW Scotland</b>				
Canna	0.48 (84)	0.45 (80)	0.39 (0.03)	16
Handa	0.45 (103)	0.48 (89)	0.48 (0.03)	13
St Kilda	0.30 (349)	0.26 (329)	0.37 (0.03)	10
<b>N Scotland</b>				
Easter Ross	0.21 (57)	0.14 (58)	0.21 (0.04)	8
Wilkhaven	no count	0.25 (55)	0.33 (0.10)	5
<b>Orkney</b>				
Rousay	0.75 (104)	0.57 (83)	0.51 (0.05)	10
<b>Shetland</b>				
Hermaness	0.42 (455)	0.25 (551)	0.44 (0.03)	13
Noss	0.47 (208)	0.29 (268)	0.44 (0.03)	9
Westerwick	0.44 (73)	0.74 (71)	0.55 (0.04)	12
Troswick Ness	0.28 (1,134)	0.38 (1,053)	0.43 (0.02)	16
Sumburgh Head	0.30 (255)	0.39 (248)	0.47 (0.03)	16
Fair Isle	0.28 (360)	0.43 (356)	0.45 (0.03)	16
<b>SE Scotland</b>				
Isle of May	0.26 (134)	0.48 (131)	0.42 (0.02)	16
Tantallon	0.16 (97)	0.01 (100)	0.38 (0.04)	15
St Abb's Head	0.28 (43)	0.32 (44)	0.19 (0.04)	7
<b>NE England</b>				
Farnes	0.66 (149)	0.69 (174)	0.54 (0.03)	16
<b>Isle of Man</b>				
Traie Vane-Gob yn Ushtey	no count	0.15 (115)	0.23 (0.03)	12
Bradda	0.34 (44)	0.48 (37)	0.32 (0.02)	10
Glen Mooar – Gob y Deigan	no count	0.22 (36)	0.33 (0.03)	3
<b>Wales</b>				
Skomer	0.38 (106)	0.49 (99)	0.55 (0.05)	10
Skokholm	0.37 (152)	0.41 (176)	0.48 (0.03)	8
Bardsey	0.91 (45)	0.95 (43)	0.73 (0.1)	6

**Table 3.2.4** Northern fulmar breeding success grouped regionally, 2001-2002: estimated number of chicks fledged per apparently occupied site at sample colonies (superscript n = number of colonies). Figures are based on regularly occupied sites or on the average numbers of occupied sites in June, and are presented as the means and standard errors of figures for individual colonies. Changes in breeding success are indicated for colonies where similar methods have been used in both years; none of these is statistically significant.

Region □	2001 chicks fledged/site				2002 chicks fledged/site				2001-2002 change	
	AOS <sup>n</sup>	Range	Mean	±s.e.	AOS <sup>n</sup>	Range	Mean	±s.e.	Mean <sup>n</sup>	±s.e.
SW Scotland <sup>a</sup>	16 <sup>1</sup>	-	0.50	-	14 <sup>1</sup>	-	0.71	-	+0.21 <sup>1</sup>	-
NW Scotland <sup>b</sup>	536 <sup>3</sup>	0.30-0.45	0.40	±0.05	498 <sup>3</sup>	0.26-0.48	0.39	±0.07	-0.01 <sup>3</sup>	±0.02
Shetland <sup>c</sup>	2,830 <sup>7</sup>	0.28-0.47	0.38	±0.03	2,862 <sup>7</sup>	0.23-0.74	0.41	±0.06	+0.04 <sup>7</sup>	±0.06
Orkney <sup>d</sup>	751 <sup>6</sup>	0.26-0.75	0.47	±0.06	663 <sup>5</sup>	0.40-0.57	0.48	±0.03	-0.03 <sup>5</sup>	±0.04
N Scotland <sup>e</sup>	57 <sup>1</sup>	-	0.21	-	113 <sup>2</sup>	0.14-0.25	0.20	±0.06	-0.07 <sup>1</sup>	-
SE Scotland <sup>f</sup>	274 <sup>3</sup>	0.16-0.28	0.23	±0.04	275 <sup>3</sup>	0.01-0.48	0.27	±0.14	-0.04 <sup>3</sup>	±0.11
NE England <sup>g</sup>	149 <sup>1</sup>	-	0.66	-	174 <sup>1</sup>	-	0.69	-	+0.02 <sup>1</sup>	-
Wales <sup>h</sup>	303 <sup>3</sup>	0.37-0.91	0.55	±0.18	318 <sup>3</sup>	0.41-0.95	0.62	±0.17	+0.06 <sup>3</sup>	±0.02
Isle of Man <sup>i</sup>	44 <sup>1</sup>	-	0.34	-	219 <sup>5</sup>	0.15-0.48	0.34	±0.07	+0.14 <sup>1</sup>	-
NE Ireland <sup>j</sup>	-	-	-	-	7 <sup>1</sup>	-	0.43	-	-	-
Total	4,960 <sup>26</sup>	0.16-0.91	0.41	±0.03	5,143 <sup>31</sup>	0.01-0.95	0.42	±0.03	-0.03 <sup>25</sup>	±0.03

Colonies: <sup>a</sup> Ailsa Craig; <sup>b</sup> Canna, Handa, St Kilda; <sup>c</sup> Hermaness, Eshaness, Noss, Westerwick, Troswick Ness, Sumburgh Head, Fair Isle; <sup>d</sup> Costa Head, Mull Head, Gultak, Rousay, North Ronaldsay (2001 only), Papa Westray; <sup>e</sup> Easter Ross, Wilkhaven (2002 only); <sup>f</sup> Isle of May, Tantallon, St Abb's Head; <sup>g</sup> Farne Islands; <sup>h</sup> Skomer, Skokholm, Bardsey; <sup>i</sup> Traie Vane-Gob yn Ushtey (2002 only), Glen Maye (2002 only), Bradda, Glen Mooar-Gob y Deigan (2002 only), Cass Strooan-Peel Headlands (2002 only); <sup>j</sup> Old Lighthouse Island (2002 only).

### 3.3 Manx shearwater *Puffinus puffinus*

#### *Breeding numbers and breeding success (Table 3.3.1)*

In **north-west Scotland**, the breeding season was the most successful on Rum since 1997 (Ramsay 2003). Occupancy in a sample of 99 monitored burrows was 80% with breeding success equal to that recorded in 2001 and above average. On Canna, no birds responded to taped calls from 100 burrows checked between the Nunnery and Garrisdale, where only one responded in 2001 (Swann 2002a). Data was received from Sanda (**south-west Scotland**) for a second year where success was again high, although lower than that recorded in 2001.

In **Wales**, 795 occupied burrows were counted in the monitoring plots on Skokholm, compared with 715 AOB in 1999 and 771 AOB in 2001 (G. Thompson, pers. comm.). It was another productive season on Bardsey, with breeding success from 50 study nests equal to the long-term mean. However, in May and June a minimum of 80 eggs were taken by a single pair of carrion crows *Corvus corone* that had learnt to find accessible nest chambers (Stansfield 2002). On Skomer, although hatching success was normal, productivity was again low compared to other colonies but above the long-term mean for the island. The survival rate of adults, at 74% in 2002, was low although there has been no discernible trend in this rate since recording began in 1977 (Perrins 2003).

On Old Lighthouse Island (**north-east Ireland**), in addition to the census carried out in 2000 (Mavor *et al.* 2001), two further small areas occupied by shearwaters were detected and found to contain c.200 pairs. This colony is now estimated to hold in the region of 3,100 pairs (N. McKee, pers. comm.). On nearby Big Copeland, a partial survey revealed 1,537 occupied burrows. Further coverage of the unsurveyed areas is planned for 2003. At the moment these areas are estimated to hold c.400 occupied burrows, suggesting the total island population could number c.2,000 pairs (a six-hour preliminary survey had estimated 3,000 pairs in 2000) (N. McKee, pers. comm.).

**Table 3.3.1** Breeding success of Manx shearwaters, 2001-2002 and 1986-2001. Figures are the number of chicks fledged per occupied burrow or burrow with egg. Figures in parentheses under 2001 and 2002 are the number of occupied burrows from which success estimate was derived.

Region/site	2001	2002	1986-2001 mean	
			Mean ( $\pm$ s.e.)	No. of years
<b>NW Scotland</b>				
Rum	0.73 (76)	0.73 (99)	0.69 (0.06 )	8
<b>SW Scotland</b>				
Sanda	0.82 (61)	0.71 (66)	-	1
<b>Wales</b>				
Skomer	0.43 (98)	0.57 (108)	0.53 (0.05 )	10
Bardsey	0.78 (50)	0.80 (50)	0.80 (0.01 )	6

### 3.4 European storm-petrel *Hydrobates pelagicus*

#### *Breeding numbers 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. Because of this, estimates for total breeding numbers of European and Leach's storm-petrels remain uncertain (Lloyd *et al.* 1991). However, more recently, 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 in Seabird 2000. Other methods are also used to monitor populations on an annual basis. The count unit is the apparently occupied site.

On Mousa, **Shetland**, 2002 was a slightly late but successful season. On 7 September, 47 chicks were ringed at the usual sites (cf. 35 in 2001, 49 in 2000 and 38 in 1999) and the largest chick was still at least 10 days from fledging (Okill 2002). There were six adults that were still incubating, at least two chicks that were not accessible, one moribund chick and at least nine sites that had failed at the egg stage. An attempt was made to locate breeding storm petrels on Foula; which failed to find any and it appears that the population there has declined over the last decade and very few probably remain (S. Gear, pers. comm.). On Noss nocturnal searches of suitable habitat failed to find any apparently occupied sites. Breeding had been suspected on the island due to the presence of remains of European storm petrels in the middens of feral cats during the 1980s, which is probably why no breeding petrels were found in 2002.

On Bardsey Island (Ynys Enlli), **Wales**, successful breeding by European storm petrels was first confirmed in 2000, when 10AOS were located with diurnal tape playback, which produced at least five chicks. In 2001, nine birds responded to diurnal playback in mid-June, but attendance and response rate is much lower at that time than during the peak incubation period in mid July (Ratcliffe *et al.* 1998). A more thorough survey in 2002 found at least 35AOS at four sites.

The first ever tape playback survey of European storm petrels on Burhou, **Channel Islands**, in 2002 found a total of 21 responses. Using the correction factor for response rate of 2.86 (95% CLs 2.23 – 3.97) calculated on the Isles of Scilly (Ratcliffe *et al.* 1998), the total population on the island is 60AOS (95% CL 49-83AOS). A diurnal playback survey of potentially suitable petrel habitat on Lundy, **south-west England**, failed to find any breeding European storm-petrels (Price 2002).

### 3.5 Leach's storm-petrel *Oceanodroma leucorhoa*

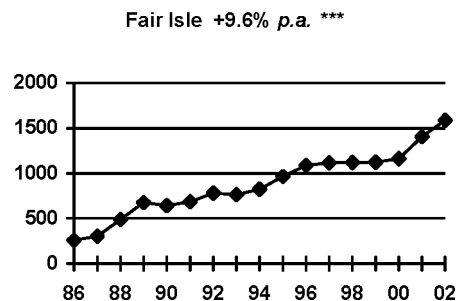
See the preceding chapter for the background to methodology and survey techniques.

The only record of Leach's storm petrel in 2002 came from Foula, Shetland. Breeding was first confirmed on Foula in 1974 (Mainwood 1975) but no comprehensive survey has been conducted. However, in 2001 night visits found birds calling from burrows, (estimate of 3-30 AOS) at a site on the south-west side of the island. Breeding was confirmed at this site in 2002 when one bird responded to diurnal tape playback (S. Gear, pers. comm.). Breeding appears to be confined to inaccessible grassy ledges on high cliffs, possibly as an attempt to evade predation from the island's population of feral cats.

### 3.6 Northern gannet *Morus bassanus*

*Breeding numbers* (Figure 3.6.1)

Only the colony on Fair Isle was counted in both 2001 and 2002 and was found to have increased by 12.7% from 1,406 AON to 1,585 AON (Shaw *et al.* 2002). Apart from small decreases in 1984 and 1990 this colony has now increased in size every year since its inception in 1975. Furthermore, with over 1,000 immature birds consistently recorded loafing in the colony in recent years, plus plenty of suitable nest sites available, it would seem that the Fair Isle population will continue to grow in the immediate future (D. Shaw, pers. comm.).



**Figure 3.6.1** Northern gannet population trend for Fair Isle, 1986-2002 (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: \*\*\*  $P < 0.001$ .

*Breeding success* (Table 3.6.1)

The mean breeding success across four colonies monitored in 2002 was 0.69 chicks fledged per occupied nest, equal to the 1986-2001 mean of 0.69 (s.e.  $\pm 0.01$ ), based on between three and six colonies annually. In 2002, productivity at Ailsa Craig and Noss was higher than average, with northern gannets at the former site having their most successful breeding season since 1998. At Hermaness, productivity was close to the long-term average but on Fair Isle breeding success was again below average for the third year since 1998. On Great Saltee, fledging success from a sample of 300 nests was 0.85 chicks per nest (O. Merne, pers. comm.).

**Table 3.6.1** Northern gannet breeding success, 1986-2001, 2001 and 2002: estimated number of chicks fledged per occupied nest. In 2001 and 2002, with the exception of Fair Isle, productivity is shown as the mean and standard error of figures from sample plots (superscript n = number of plots). The 2001 and 2002 figures for Fair Isle are for all nests totalled across sample plots.

Colony	1986-2001 fledged /nest			2001 fledged/nest			2002 fledged/nest		
	Years	Mean	± s.e.	AON <sup>n</sup>	Mean	± s.e.	AON <sup>n</sup>	Mean	± s.e.
Ailsa Craig (SW Scotland)	11	0.68	±0.02	245 <sup>2</sup>	0.64	±0.08	241 <sup>2</sup>	0.74	±0.10
Hermaness (Shetland)	13	0.66	±0.02	688 <sup>3</sup>	0.66	±0.01	792 <sup>3</sup>	0.64	±0.03
Noss (Shetland)	16	0.70	±0.01	469 <sup>4</sup>	0.84	±0.08	464 <sup>4</sup>	0.78	±0.02
Fair Isle (Shetland)	16	0.69	±0.02	173 <sup>1</sup>	0.75	-	224 <sup>1</sup>	0.61	-
Troup Head (NE Scotland)	6	0.57	±0.04	1,227 <sup>1</sup>	≤0.67	-	-	-	-
All colonies	-	0.69	±0.01	2,802	0.71	±0.04	1,721	0.69	±0.04

### 3.7 Great cormorant *Phalacrocorax carbo*

*Comparisons of 2002 with 2001 were limited because of access restrictions imposed due to foot and mouth disease in 2001. Numbers of breeding great cormorants increased or remained stable in most regions in 2002, compared with 2001, but some Welsh colonies decreased. A large decline occurred at the single monitored colony in south-east Ireland between 1999 and 2002. However, it should be noted that counts of breeding pairs of cormorants can be difficult to interpret, particularly where regional coverage is incomplete; birds may move between colonies and variable proportions of adults breed each year. Overall breeding success in 2002 was marginally below that of 2001 (although few data were collected in 2001) and below the mean of 1992-2001.*

*Breeding numbers (Tables 3.7.1 and 3.7.2, Figure 3.7.1)*

In **south-west Scotland**, the region as a whole saw a moderate increase in 2002 compared with 2001. The number on Sanda decreased, however, by 21%, while on Ruadha Sgeir there was a large increase compared with 2001. After seven consecutive years of occupation by great cormorants, Carraig an Daimh was abandoned in 2002, apparently for nearby (3.5km) Corr Eilean, which has not had the species breeding since 1994. On Eilean Buidhe, the number reached its maximum since it was colonised in 1994.

In **north Scotland**, the only site not affected by foot-and-mouth access restrictions in 2001 was North Sutor; where numbers increased between 2001 and 2002 (Swann 2002b). Elsewhere, comparisons between 2000 and 2002 showed a decrease at Stacks of Occumster (from 24 to 19 AON) and an increase at Ord of Caithness (from 47 to 68 AON). In **Shetland**, a moderate increase between 2001 and 2002 was seen at each of the three larger colonies that were monitored there (Okill 2002b), following a large increase between 2000 and 2001, such that the population index was the highest since 1990.

The overall number of breeding cormorants remained stable in **south-east Scotland**. A sizable increase was recorded at Inchkeith and a similar decrease at Carr Craig (Jones 2002). The population index for the region has remained quite stable since the mid 1990s. Numbers at the two colonies monitored in **north-east England** in 2002 (Farne Islands and Saltburn) were similar to those in 2001. Despite a large increase in the population index between 2000 and 2001, the population at these sites is about 25% smaller than it was during the early to mid 1990s.



In **south-west England**, moderate increases in 2002 compared with 2001 were recorded in Dorset at Gad Cliff (Sellers 2002) and Ballard Cliff (Morrison 2002), the only two colonies in the region for which comparable data are available. On the Great Mew Stone, the number in 2002 (100 AON) was back to the 'normal' level, following low numbers in 1998 and 1999, with no count in 2001.

In **north-west England**, no comparisons with 2001 are available, but between 2000 and 2002 the number at St Bees increased to its highest level since colonisation there in 1992 (from 31 to 43 AON). At Maughold Head, numbers of nests also increased during the same period, from 81 to 109.

In **inland England**, the colony at Abberton Reservoir decreased from 370 AON in 2000 to 322 AON in 2002, continuing the decline of the colony, which started around the mid 1990s, and marking the lowest number there since the 'building stage' of the colony in 1988. At Aldermaston, the colony increased from 25 AON in 2000 to 33 in 2002, the highest number since this colony started in 1996. The Dungeness colony decreased from 75 AON in 2000 to 55 AON in 2002.

Most of the monitored colonies in **Wales** for which there is comparable data—Skomer (Brown and Duffield 2002), Ynys Gwylan, Great Orme - showed moderate or severe declines between 2001 and 2002, although in contrast St Margaret's Island showed a small increase. However, fewer colonies than usual were counted in 2001 (due to foot and mouth), so this apparent decrease may not be representative of the whole country. Indeed, the regional index, which for 2002 compares data from sites monitored in 2000 and 2002, shows little change between these years, although the index is biased by the large colony at Little Orme, which increased from 183 to 304 AON between 2000 and 2002.

**Table 3.7.1** Population changes of great cormorant 2001-2002 and 1986-2001 at selected sites referred to in the text.

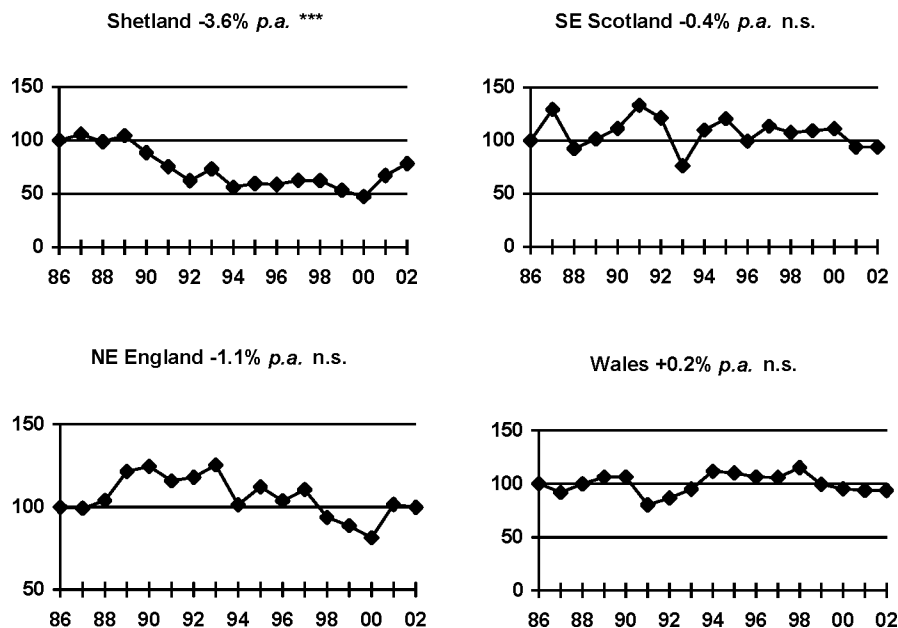
Region/Site	2001	2002	% Change 2001-2002	1986-2001 Mean ( $\pm$ s.d.)	No. of years
<b>SW Scotland</b>					
Sanda	28	22	-21.4	25 (6.0)	14
Ruadha Sgeir	19	27	+42.1	-	-
Carraig an Daimh	27	0	-	42 (6.6)	7
Corr Eilean	0	30	-	-	-
Eilean Buidhe	74	85	+14.9	39 (20.4)	8
<b>N Scotland</b>					
North Sutor	181	206	+13.8	225 (36.8)	11
<b>Shetland</b>					
High Holm	39	50	+28.2	43 (7.0)	11
Clett Stacks	122	148	+21.3	129 (30.5)	11
W Muckle Roe	75	79	+5.3	79 (13.3)	11
<b>SE Scotland</b>					
Inchkeith	82	102	+24.4	-	-
Carr Craig	117	91	-22.2	114 (63.1)	15
<b>NE England</b>					
Farne Islands	196	190	-3.1	227 (43.6)	16
Saltburn	30	32	+6.7	43 (10.1)	15
<b>SW England</b>					
Gad Cliff	43	50	+16.3	81 (27.3)	14
Ballard Cliff	82	97	+18.3	110 (31.2)	12
<b>Wales</b>					
Skomer	15	8	-46.6	16 (5.4)	15
Ynys Gwylan	78	32	-59.0	67 (16.5)	14
Great Orme	32	27	-15.6	49 (18.6)	11
St Margaret's Island	137	145	+5.8	214 (50)	16

In **south-east Ireland**, numbers at Lambay Island (Dublin) decreased from 675 in 1999 (the last year that site was counted) to 480 in 2002. Previous counts there during the period of SMP were 605 in 1995 and 1,045 in 1991. This indicates a long term decline at this major colony, perhaps attributable to redistribution of birds to nearby colonies, although no data is available to support this (Madden and Newton 2002).

**Table 3.7.2** Regional population changes at monitored great cormorant colonies, 2001-2002 (apparently occupied nests in May-June). Regional samples of fewer than 50 AON or of only one colony are excluded. Trends for 1986-2001 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	2001	2002	2001-2002 % change	% annual change
SW Scotland <sup>a</sup>	155	176	+13.5	+0.6 n.s. 1986-2001
Shetland <sup>b</sup>	243	283	+16.5	-4.6*** 1986-2001
SE Scotland <sup>c</sup>	372	372	0.0	-0.2 n.s. 1986-2001
NE England <sup>d</sup>	226	222	-1.8	-1.2 n.s. 1986-2001
SW England <sup>e</sup>	125	147	+17.6	-1.8** 1986-2001
Wales <sup>f</sup>	262	212	-19.1	+0.4 n.s. 1986-2001

Colonies: <sup>a</sup> Sanda, Ruadh Sgeir, Corr Eilean, Carraig an Daimh, Eilean Dubh, Eilean Buidhe (Portavadie), Eilean Buidhe (Black Harbour); <sup>b</sup> Clett Stacks, Heads of Grocken, High Holm, W Muckle Roe; <sup>c</sup> Carr Craig, The Lamb, Inchkeith, Inchmickery, Craigleith; <sup>d</sup> Farne Islands, Huntcliff; <sup>e</sup> Ballard Cliff, Gad Cliff; <sup>f</sup> Skomer, Ynys Gwylan, Great Orme.



**Figure 3.7.1** Regional population indices for breeding great cormorant, 1986-2002 (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, \*\*\*  $P < 0.001$ .

*Breeding success (Table 3.7.3)*

Mean productivity across all sites in 2002 was 2.01 chicks per AON (s.e.=0.17, n=12), marginally below the mean for 2001 of 2.19 (s.e.=0.19, n=7) and the mean of the previous 10 years (1992-2001) of 2.15 (s.e.=0.81).

In **south-west Scotland**, breeding success fell at Rudha Sgeir and Eilean Buidhe but increased somewhat at Eilean Dubh. The only colony monitored in **north-west Scotland** - An Glas Eilean – decreased in productivity in 2002, following the productive season of 2001. At the two colonies monitored in **northern Scotland** in 2002, little change in productivity was recorded compared with 2001 (at Ceann Leathad, no count was done in 2001, so comparison is with 2000).

At Ballard Cliff in **south-west England**, breeding success decreased slightly compared with 2001, which was the first year in which the parameter was measured there (Morrison 2002). In **north-west England**, on the Isle of Man, productivity of the single colony monitored there in 2002 was similar to that in 2000 (not recorded in 2001). At south Solway, productivity was 1.79 chicks per AON (the first time breeding success has been recorded there). In **inland England**, the colony at Aldermaston produced 2.42 chicks per AON; this is the first time productivity data has been received for this site.

On Lambay (**south-east Ireland**), the contents of 422 nests were recorded from which the mean clutch/brood size was 2.54, compared with 3.30 in 1999 (Madden and Newton 2000). At Ireland's Eye 2.70 chicks per AON were produced; this is the first time such data has been supplied for this site.

**Table 3.7.3** Breeding success (chicks fledged per occupied nest) of great cormorant 2001-2002 and 1986-2001 at selected sites referred to in the text. Figures in parentheses under 2001 and 2002 are the number of nests from which success estimate was derived.

Region/site	2001	2002	1986-2001 mean ( $\pm$ s.e.)	No. of years
<b>South-west Scotland</b>				
Rudha Sgeir	c. 2.00 (19)	1.48 (27)	-	-
Eilean Buidhe	<2.06 (74)	1.34 (85)	1.60 (0.21)	8
Eilean Dubh	2.29 (7)	2.54 (13)	-	-
<b>North-west Scotland</b>				
An Glas Eilean	c. 2.24 (25)	0.92-1.35 (26)	1.65 (0.21)	8
<b>North Scotland</b>				
North Sutor	2.47 (66)	2.40 (108)	2.07 (0.15)	10
Ceann Leathad <sup>1</sup>	2.21 (36)	2.27 (34)	2.24 (0.18)	5
<b>South-west England</b>				
Ballard Cliff	1.33 (42)	1.14 (97)	-	-
<b>North-west England</b>				
Will's Strand <sup>1</sup>	2.38 (26)	2.44 (27)	-	-

Note:

1. No record for 2001 for Ceann Leathad or Will's Strand; comparison is with 2000.

### 3.8 European shag *Phalacrocorax aristotelis*

*Numbers of European shag nests generally increased or remained stable in 2002, compared with 2001, apart from in Shetland, north-west Scotland and north-east England, where numbers at monitored colonies declined. The important colony on Canna was smaller than at any time since 1986. Breeding success in most regions was higher in 2002 than in 2001, apart from in south-west and north Scotland, where small declines occurred. It should be noted, in interpreting breeding numbers of European shags, that a variable proportion of adults nest in a given year, and that a change in the number nesting does not necessarily equate to a change in the number present or alive. Productivity on Canna, although higher than in the near failure of 2001, was again low. Fair Isle, Isle of May and Bardsey recorded their most productive seasons, Sumburgh Head its second most productive, and the Farne Islands birds were at their most productive since 1992.*

*Breeding numbers (Tables 3.8.1 and 3.8.2, Figure 3.8.1)*

A moderate overall decrease was seen in **north-west Scotland** in 2002, compared with 2001, although comparable data are available only for four sites in this region. The number on Canna was the lowest since 1986 (Swann 2002a). On An Glas Eilean the small colony increased, following a very low count in 2001. The colony on Eigg decreased slightly. In **Shetland**, the overall number decreased, although on the coast between Troswick and Virkie numbers were slightly higher than in 2001. Large increases were seen at Papa Stour and south-east Yell between 1999 and 2002 (no counts in 2000 or 2001)- from 240 to 357 AON and from 62 to 150 AON, respectively. On the Farne Islands, in **north-east England**, there was a small decrease in number compared with 2001 (Walton 2002); the recovery from the 1994 'wreck' continues to be slow.

In **south-west Scotland** a moderate overall increase in numbers occurred between 2001 and 2002, but there was much intra-colony variation. A large increase was seen at Lunga (Ward 2002), and at the small colonies at Mull of Galloway and Eilean Buidhe, following the low counts in 2001. The colony on Sanda was of a similar size to that recorded in 2001; indeed it has been rather stable throughout the last decade. A decrease occurred at the small colony on Carraig an Daimh and at the sample plots on Colonsay.

At North Sutor, the only colony in **north Scotland** which is monitored, the number increased between 2001 and 2002 (Swann 2002b), to the highest level since monitoring started there in 1991.

In **south-east Scotland**, the overall number of European shags in 2002 was very similar to that in 2001, so - as in north-east England - the recovery from the 'wreck' of 1994 remains slow. A moderate decrease occurred on the Isle of May, the region's largest colony (Wilson *et al.* 2002). The colonies on Inchkeith and Inchmickery increased in 2002, to their greatest size in the period of the SMP; on the eastern side of the Firth of Forth, the number on Fidra increased significantly, while numbers on Craighleith and the Lamb remained stable (Jones 2002). The number at St Abb's Head was similar to that recorded in 2001 (Rideout and Beaumont 2002).

Few data were received from colonies in **Wales**. The number on Bardsey increased in 2002 compared with 2001 (Stansfield 2002), to reach its highest total there in the period of the SMP. The small colony at Elegug Stacks also increased.

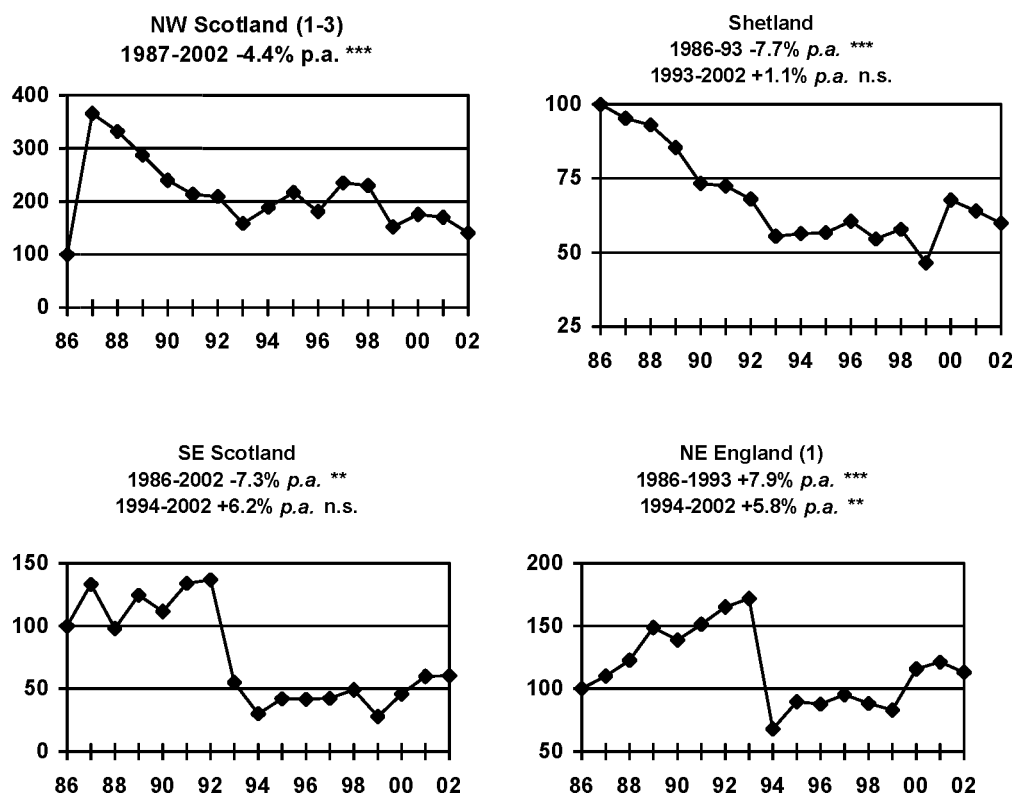
**Table 3.8.1** Regional population changes at monitored European shag colonies, 2001-2002 (apparently occupied nests in May-June). Counts with a reported inaccuracy of  $> \pm 5\%$ , and regional samples  $< 100$  AON, are excluded. Trends for 1986-2001 are average annual rates of change shown by sample populations. Significance of trends indicated as: n.s. not significant, \*  $P < 0.05$ , \*\*\*  $P < 0.001$ . Further details of calculation of trends are given in section 1.2.2.

Region	2001	2002	2001-2002	% annual change
SW Scotland <sup>a</sup>	1,019	1,148	+12.7	+1.5 n.s. 1994-2001
NW Scotland <sup>b</sup>	904	724	-19.9	-4.2*** 1987-2001
Shetland <sup>c</sup>	862	807	-6.4	-3.7*** 1986-2001
N Scotland <sup>d</sup>	322	374	+16.1	-
SE Scotland <sup>e</sup>	1,682	1,690	+0.5	+5.1 n.s. 1994-2001
NE England <sup>f</sup>	1,373	1,282	-6.6	+6.2* 1994-2001

Colonies: <sup>a</sup> Mull of Galloway, Colonsay (sample plots), Sanda Island, Lunga, Carraig an Daimh, Eilean Buidhe, Ruadh Sgeir, Eilean na Cille; <sup>b</sup> Eigg, Canna, An Glas Eilean; <sup>c</sup> Fair Isle (plots), Noss, Sumburgh Head, Noness (land only), Troswick-Virkie, Strandburgh Ness; <sup>d</sup> North Sutor; <sup>e</sup> Isle of May, Inchkeith, Fidra, Inchmickery, Inchcolm, Haystack, Carr Craig, Craigleith, The Lamb, Bass Rock, St Abb's Head; <sup>f</sup> Farne Islands.

**Table 3.8.2.** Population changes of European shag 2001-2002 and 1986-2001 at selected colonies mentioned in the text.

Region/Site	2001	2002	% Change 2001-2002	1986-2001 Mean ( $\pm$ s.d.)	No. of years
<b>SW Scotland</b>					
Lunga	197	286	+45.2	201 (78.3)	9
Mull of Galloway	27	54	+100	47 (13.3)	13
Eilean Buidhe	26	36	+38.5	32 (5.7)	8
Sanda	565	600	+6.2	566 (91.5)	9
Carraig an Daimh	30	9	-70.0	30 (16.7)	8
Colonsay (sample plots)	44	37	-15.9	40 (6.6)	9
<b>NW Scotland</b>					
Canna	844	638	-24.4	983 (286.4)	16
An Glas Eilean	10	40	+300	44 (42.1)	8
Eigg	50	46	-8.0	71 (16.6)	13
<b>Shetland</b>					
Troswick to Virkie	164	170	+3.7	129 (20.6)	7
Sumburgh Head	261	249	-4.6	272 (115.4)	15
Noness	138	130	-5.8	115 (20.1)	12
Fair Isle	149	135	-9.4	182 (40.4)	16
<b>N Scotland</b>					
North Sutor	322	374	+16.1	252 (43.1)	7
<b>SE Scotland</b>					
Isle of May	734	676	-7.9	970 (544)	16
Inchkeith	78	104	+33.3	25 (19.0)	15
Inchmickery	41	52	+26.8	26 (8.0)	12
Fidra	139	186	+33.8	112 (58.0)	16
Craigleith	237	233	-1.7	334 (198)	15
The Lamb	99	102	+3.0	142 (111)	12
St Abb's Head	300	296	-1.3	282 (110)	16
<b>NE England</b>					
Farne Islands	1373	1282	-6.6	1,314 (357)	16
<b>Wales</b>					
Bardsey	61	71	+16.4	26 (13.2)	16
Elegug Stacks	3	7	+133.3	3 (0.7)	6



**Figure 3.8.1** Population indices for breeding European shags, 1986-2002 (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 shags on Canna not nesting in 1986. Statistical significance of trends indicated as: n.s. not significant, \*\*  $P < 0.01$ , \*\*\*  $P < 0.001$ .

#### Breeding success (Tables 3.8.3 and 3.8.4)

The mean breeding success in 2002 across 15 colonies was slightly above the mean value for 2001 and above the 1986-2001 mean taken from between three and 20 sample colonies each year, of 1.31 (s.e.  $\pm 0.08$ ) chicks per AON. Indeed, the mean value for 2002 was higher than any year since 1995. However, a paired t-test of productivity between colonies in 2001 and 2002 revealed no statistically significant difference ( $t=0.60$ , d.f=14,  $P>0.10$ ).

In **Shetland**, overall productivity across the three monitored colonies was higher in 2002 than in 2001, although intra-colony variation was marked. Large increases occurred at Sumburgh Head (to the second highest productivity recorded during the SMP) and Fair Isle (to the highest recorded in the SMP; Shaw *et al.* 2002). Conversely, productivity on Foula decreased between 2001 and 2002, and surviving chicks appeared to be in poor condition in 2002, perhaps due to food shortage (Furness 2002). In **south-east Scotland**, breeding success in 2002 was higher than in 2001 (itself a productive year), with the Isle of May recording its most successful season during the period of the SMP (Wilson *et al.* 2002). Similarly, St Abb's Head recorded high productivity in 2002 (Rideout and Beaumont 2002). In **Wales**, breeding success on Bardsey (the only Welsh colony for which data was collected in both 2001 and 2002) increased from an already high value in 2001 to the highest recorded during the SMP for the island (Stansfield 2002).

In **south-west Scotland**, overall breeding success in 2002 was slightly below that in 2001. On Sanda, productivity was lower than that recorded in the very productive year of 2001; these are the first two years for which we have received such data from the island. On both Ruadha Sgeir and Eilean na Cille, productivity was the lowest (just) recorded on each of the islands, since its monitoring started there in 1993, although at the latter site productivity was still relatively high.

Overall, colonies in **north-west Scotland** were more productive in 2002 than they were in 2001, although the mean for the region was the lowest of all the regions in 2002. The colony on Canna was rather unproductive, though less so than the virtual failure in 2001 (Swann 2002a). The three least productive years for this colony during the SMP have been 2000, 2001 and 2002. On Rum, productivity was measured for the second year in 2002 and was slightly above the 2001 figure. The modest colony on An Glas Eilean was more productive in 2002 than in 2001, recording its highest success since monitoring began there in 1993.

At North Sutor, the only colony monitored in **north Scotland**, productivity fell between 2001 and 2002 (Swann 2002b), to slightly below the long term average for the colony.

On the Farne Islands, in **north-east England**, a small increase in productivity occurred between 2001 and 2002 (Walton 2002), to the highest value there since 1992.

On Lambay (**SE Ireland**), mean brood/clutch size from a sample of 159 nests was 2.26, compared with 3.00 in 1999 (Madden and Newton 2002).

**Table 3.8.3** European shag breeding success, grouped regionally 2001-2002: estimated number of chicks fledged per occupied nest at sample colonies (superscript n = number of colonies). Figures are based on nests where eggs or apparent incubation were recorded, and are presented as the mean and standard error of figures for individual colonies. Only colonies where ten or more nests were monitored are included. The figures used for some colonies in both years in south-west Scotland as well as for An Glas Eilean in north-west Scotland are based on just one or a few visits and are therefore approximate; those for other colonies and regions are based on regular checks of sample nests. Changes in breeding success are indicated for colonies studied in both years; none of these is statistically significant.

Regions □	2001 chicks fledged/nest				2002 chicks fledged/nest				2001-2002 change	
	Nests <sup>n</sup>	Range	Mean	±s.e.	Nests <sup>n</sup>	Range	Mean	±s.e.	Mean <sup>n</sup>	±s.e.
SW Scotland <sup>a</sup>	300 <sup>7</sup>	0-2.31	1.56	±0.29	283 <sup>4</sup>	0.48-2.50	1.50	±0.41	-0.04 <sup>4</sup>	±0.43
NW Scotland <sup>b</sup>	152 <sup>3</sup>	0.10-1.00	0.69	±0.29	138 <sup>3</sup>	0.26-1.75	1.03	±0.43	-0.34 <sup>3</sup>	±0.20
Shetland <sup>c</sup>	313 <sup>3</sup>	0.96-1.58	1.27	±0.18	305 <sup>3</sup>	0.66-1.98	1.39	±0.39	+0.11 <sup>3</sup>	±0.21
N Scotland <sup>d</sup>	82 <sup>1</sup>	-	1.74	-	88 <sup>1</sup>	-	1.45	-	-0.29 <sup>1</sup>	-
SE Scotland <sup>e</sup>	227 <sup>2</sup>	1.51-1.68	1.60	±0.08	211 <sup>2</sup>	1.76-1.76	1.76	0.0	+0.17 <sup>2</sup>	±0.09
NE England <sup>f</sup>	152 <sup>1</sup>	-	1.01	-	316 <sup>1</sup>	-	1.12	-	+0.11 <sup>1</sup>	-
Wales <sup>g</sup>	194 <sup>2</sup>	1.92-2.03	1.98	±0.0.6	71 <sup>1</sup>	-	2.63	-	+0.60 <sup>1</sup>	-
Total	1,449 <sup>19</sup>	0-2.31	1.40	±0.14	1,415 <sup>15</sup>	0.26-2.50	1.50	±0.16	+0.09 <sup>15</sup>	±0.15

Colonies: <sup>a</sup> Ruadh Sgeir, Eilean Buidhe (2001 only), Carraig an Daimh (2001 only), Eilean Dubh, Eilean na Cille, Eileanan Glasa (2001 only), Sanda; <sup>b</sup> Canna, Rum, An Glas Eilean; <sup>c</sup> Sumburgh Head, Fair Isle, Foula; <sup>d</sup> North Sutor; <sup>e</sup> Isle of May, St Abb's Head; <sup>f</sup> Farne Islands; <sup>g</sup> Bardsey, Ynys Gwylan (2001 only).

**Table 3.8.4.** Breeding success (chicks fledged per occupied nest) of European shag 2001-2002 and 1986-2001 at selected colonies mentioned in the text. Figures in parentheses under 2001 and 2002 are the number of nests from which success estimate was derived.

Region/site	2001	2002	1986-2001	No. of years
			mean ( $\pm$ s.e.)	
<b>SW Scotland</b>				
Sanda	2.31 (64)	1.60 (97)	-	-
Ruadh Sgeir	1.34 (105)	0.48 (104)	1.18 (0.16)	9
Eilean na Cille	2.11 (25)	1.41 (22)	1.92 (0.12)	9
<b>NW Scotland</b>				
Canna	0.10 (61)	0.80 (49)	1.27 (0.12)	16
Rum	0.96 (81)	1.08 (52)	-	-
An Glas Eilean	1.0 (10)	1.75 (40)	0.78 (0.22)	8
<b>Shetland</b>				
Sumburgh Head	1.28 (188)	1.52 (197)	1.19 (0.08)	11
Fair Isle	1.58 (62)	1.98 (53)	1.43 (0.06)	16
Foula	0.96 (63)	0.66 (55)	1.09 (0.20)	5
<b>N Scotland</b>				
North Sutor	1.74 (82)	1.45 (88)	1.54 (0.11)	10
<b>SE Scotland</b>				
Isle of May	1.68 (135)	1.76 (130)	0.87 (0.10)	16
St Abb's Head	1.51 (92)	1.76 (81)	1.28 (0.13)	12
<b>NE England</b>				
Farne Islands	1.01 (152)	1.12 (316)	1.03 (0.10)	13
<b>Wales</b>				
Bardsey	2.03 (61)	2.63 (71)	1.95 (0.07)	8

### 3.9 Arctic skua *Stercorarius parasiticus*

*Breeding numbers and breeding success differed considerably between Orkney and Shetland, with the latter showing a population decline at all monitored sites and generally low productivity. In contrast, Arctic skuas on Orkney increased in number and productivity, compared with 2001. Lack of available sandeels was considered the main cause of the low productivity in Shetland, but food was apparently abundant in Orkney, at least for northern colonies. The few monitored colonies in north Scotland experienced little change.*

*Breeding numbers* (Tables 3.9.1 and 3.9.2)

All seven monitored colonies in **Shetland** saw a decline in the number of apparently occupied territories (AOT) in 2002. Overall, breeding numbers fell by 21.0%, compared with 2001, to the lowest count for at least 14 years. After the partial recovery in 2001 from the lows of 1998-2000 numbers on Fair Isle declined to their lowest level since 1957 in 2002 (Shaw et al 2002). Furness (2002) attributes the 12.9% decline in the number of AOT on Foula (the lowest since 1989) to birds omitting a year of breeding rather than adult mortality. Colour-ring sightings of Foula-ringed Arctic skuas suggest that there have been at least as many Foula-ringed birds recruiting to Fair Isle in recent years as returning to their natal colony (Furness 2002). Numbers on Fetlar and Mousa decreased to their lowest levels since 1990, which is less than half the 1990-2001 mean. A very similar downward trend was also evident on Noss (Gabb & Thomas 2002) and Hermaness (Dobigny 2002) with decreases of 22.2 and 41.7% respectively between 2001 and 2002 resulting in populations around half the long-term average. Arctic skuas were present at Black Park and Lumbister on Yell and at Dalsetter, Mainland, but no counts are available.



**Table 3.9.1** Regional population changes at monitored Arctic skua colonies, 2001-2002 (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	2001	2002	2001-2002
Shetland	243	192	-21.0 <sup>6</sup>
Orkney	53	66	+24.5 <sup>2</sup>
NW Scotland	42	41	-2.4 <sup>1</sup>
Britain	338	299	-11.6 <sup>9</sup>

The situation in **Orkney** appeared to be opposite to the downward trend in Shetland. However, data is available only from one of the major sites in Orkney and may not be representative of the region as a whole. Following the recent sharp declines, the breeding number at North Hill, Papa Westray increased by 25% compared with 2001 (Meek 2002), but was still only just above half the 1989-2001 average. Other available data are from North Ronaldsay (1 AOT; A. Duncan, pers. comm.), Egilsay (2 AOT; Meek 2002), Hoy (6 AOT at one site), and from two sites at the Mainland of Orkney, Birsay Moors (55 AOT) and The Loons (1 AOT).

The all-island count at Handa, **NW Scotland**, (Stoneman & Williams 2002), with 41 AOT, showed very little change from 2001, and a site in Sutherland remained stable with four AOT.

**Table 3.9.2** Population (apparently occupied territories) changes of Arctic skua 2001–2002 and 1986-2001 at selected sites referred to in the text.

Region/site	2001	2002	% Change 2001-2002	1986-2001 Mean (±s.d.)	No. of years
<b>Shetland</b>					
Hermaness (Unst)	12	7	-41.7	13.2 (2.4)	10
Fetlar	19	9	-52.6	19.8 (2.4)	12
Noss	9	7	-22.2	14.1 (4.3)	16
Mousa	9	8	-11.1	19.1 (4.1)	12
Fair Isle	78	60	-23.1	90.0 (15.9)	15
Foula	116	101	-12.9	125.0 (15.7)	13
<b>Orkney</b>					
North Hill, Papa Westray	52	65	+25.0	124.8 (31.2)	13
<b>NW Scotland</b>					
Handa	42	41	-2.4	33.6 (5.7)	7

#### *Breeding success* (Tables 3.9.3 and 3.9.4)

Overall, **Shetland** experienced very low productivity in 2002, largely attributable to the severe lack of available sandeels on Foula. Of the 101 AOT on Foula, only 84 were known to lay eggs; few chicks hatched because many birds abandoned their eggs due to difficulties in finding food during the incubation period. The resulting productivity of 0.07 chicks per AOT was one of the lowest on record. The severe shortage apparently led several adult Arctic skuas to attempt to steal great skua eggs from unattended clutches (Furness 2002). The impact of food shortage was not as drastic elsewhere in Shetland. Fledging rate increased from 2001 at all other monitored colonies in 2002, preventing a repeat of the complete failure at most sites in 2001. On Fair Isle, Arctic skuas fledged 0.28 chicks per AOT (Shaw *et al.* 2002), a small increase on 2001, but only half the average, and on Mousa the lack of food and poor weather conditions kept productivity at a similarly low level (P. Ellis, pers. comm.). Despite an apparent abundance of food, only two chicks fledged from nine AOT on Fetlar (Smith & Bellamy 2002). Disturbance and predation by great skuas were the main causes for losses on Noss (Gabb & Thomas 2002) resulting in a productivity of 0.29 chicks per AOT, well below average. For

other areas on Shetland the season appeared to have been similarly unproductive; Okill (2002) reports sightings of only one fledged young at Eshaness and Dalsetter, two in Central Yell and none on South Bressay, Papa Stour and other areas visited. The only productive colony in Shetland in 2002 was Hermaness (Dobigny 2002), where 0.57 chicks per AOT were raised, slightly below the long-term mean.

Food was apparently abundant for most **Orkney** colonies, resulting in increased productivity in 2002, compared with 2001. North Hill, Papa Westray, was the only Arctic skua colony monitored in 2002; productivity there was above the long-term mean, at 0.74 chicks per AOT. One pair nested successfully on North Ronaldsay and two young were ringed. The only other data from elsewhere in Orkney concerned two pairs on Egilsay, which both failed.

**Table 3.9.3.** Breeding success (chick fledged per apparently occupied territory) of Arctic skua 2001–2002 and 1986–2001 at selected sites referred to in the text.

Region/site	2001	2002	1986-2001	
			mean ( $\pm$ s.e.)	No. of years
<b>Shetland</b>				
Hermaness (Unst)	0.00	0.57	0.61 (0.12)	11
Fetlar	0.00	0.22	0.48 (0.14)	15
Noss	0.00	0.29	0.48 (0.09)	16
Mousa	0.00	0.25	0.56 (0.15)	12
Fair Isle	0.17	0.28	0.64 (0.11)	14
Foula	<0.57	0.07	0.66 (0.13)	11
<b>Orkney</b>				
North Hill, Papa Westray	0.10	0.74	0.63 (0.11)	13

**Table 3.9.4** Arctic skua breeding success grouped regionally, 2001–2002: 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	2001 chicks fledged/pair			2002 chicks fledged/pair		
	AOT <sup>n</sup>	Range	Overall	AOT <sup>n</sup>	Range	Overall
Shetland	243 <sup>6</sup>	0.00–0.57	0.32	192 <sup>6</sup>	0.07–0.57	0.18
Orkney	52 <sup>1</sup>	-	0.10	65 <sup>1</sup>	-	0.74

### 3.10 Great skua *Catharacta skua*

*The population on Handa in 2002 was the highest on record, with 245 AOT, but numbers showed little change in Orkney and declined slightly in Shetland. Severe food shortage resulted in the lowest productivity on record in Fair Isle and affected success in other parts of Shetland, with the exception of Fetlar and Hermaness. However, Orkney in 2002 experienced its highest productivity on record.*

#### *Breeding numbers* (Tables 3.10.1 and 3.10.2)

Between 2001 and 2002, numbers of apparently occupied territories on monitored study sites on **Shetland** fell slightly. Hermaness (Unst) was the only colony where numbers in 2002 fell below the long term mean

despite being the only site showing a slight increase of one AOT to 2001 (Dobigny 2002). After last years 44% increase on Fetlar numbers fell by 12 % in 2002, still being the second highest count since 1995 (Smith & Bellamy 2002). Slight decreases in breeding numbers occurred also on Mousa and Noss, but both sites remaining well above the long-term average. Numbers on Fair Isle decreased slightly by 7% (Shaw et al 2002).

**Table 3.10.1** Regional population changes at monitored great skua colonies, 2001–2002 (apparently occupied territories). Superscript = number of colonies counted in both years.

Region	2001	2002	2001-2002 % change
Shetland	336	315	-6.3 <sup>5</sup>
Orkney	9	10	+11.1 <sup>1</sup>

The few data available from **Orkney** (Meek 2002) came from the colony at North Hill, Papa Westray, where numbers remained at the average of 10 AOT. At Birsay Moors 26 AOT were recorded and Great skuas were present at Hoy and Trumland.

A large increase was reported from Handa, **north-west Scotland**, where numbers were up by over 25% from 2000 resulting in more than twice the long-term average of 120.4 AOT (s.d. = 48.3) (Stoneman & Williams 2002). On Canna one AOT was present (Swann 2002) and Priest Island remained stable at three AOT. In **south-west Scotland**, two pairs bred on the Treshnish Isles.

**Table 3.10.2** Population (apparently occupied territories) changes of great skuas 2001–2002 and 1986–2001 at selected sites referred to in the text (- indicates no data available).

Region/Site	2001	2002	% Change 2001-2002	1986-2001 Mean ( $\pm$ s.d.)	No. of years
<b>Shetland</b>					
Hermaness (Unst)	35	36	+2.9	45.1 (17.1)	13
Fetlar	75	66	-12.0	58.9 (7.7)	7
Noss	59	58	-1.7	50.1 (12.7)	14
Mousa	24	22	-8.3	14.3 (4.9)	8
Fair Isle	143	133	-7.0	105.3 (28.5)	15
<b>Orkney</b>					
North Hill, Papa Westray	9	10	+11.1	10.0 (1.8)	6
<b>NW Scotland</b>					
Handa	-	245	-	120.4 (48.3)	8

#### *Breeding success* (Tables 3.10.3 and 3.10.4)

Productivity varied greatly in **Shetland**. Birds on Fair Isle experienced their lowest breeding success on record, whereas those on Fetlar had one of the most productive seasons for eight years. Lack of food early in the season caused losses of eggs and chicks on Foula, but an abundance of herring and mackerel discards from fishing boats in July led to very high weights of surviving chicks (Furness 2002). Overall, productivity within the study plots was average, though slightly below that recorded in 2001. Hermaness saw a very similar breeding season to 2001 and productivity remained above average. On Mousa 15 fledged chicks were located and productivity was down from 2001 (P. Ellis, pers. comm.). Birds on Noss had a below average season with a breeding success of 0.45 chicks per

AOT (Gabb & Thomas 2002). Ringing records indicated an unproductive season for colonies in south Bressay, Fitfull Head, Eshaness and the Scalloway Islands (Okill 2002).

In **Orkney**, the colony on North Hill, Papa Westray, saw its highest productivity since 1996, raising an average of 1.1 chicks per AOT. It is not known whether other sites in the region experienced a similarly good breeding season, as no data is available.

The single nest on Canna, **north-west Scotland**, failed after hatching. On the Treshnish Isles, **south-west Scotland**, one pair produced two chicks and one pair incubated two eggs.

**Table 3.10.3** Breeding success (chicks fledged per apparently occupied territory) of great skuas 2001–2002 and 1986–2001 at selected sites referred to in the text.

Region/site	2001	2002	1986–2001 mean ( $\pm$ s.e.)	No. of years
<b>Shetland</b>				
Hermaness (Unst)	0.91	0.92	0.85 (0.06)	14
Fetlar	0.76	1.14	0.88 (0.11)	7
Noss	0.15	0.45	0.54 (0.07)	14
Mousa	0.75	0.68	0.79 (0.08)	9
Fair Isle	0.66	0.16	0.83 (0.06)	13
Foula	0.70	0.63	0.63 (0.09)	13
<b>Orkney</b>				
North Hill, Papa Westray	0.33	1.1	0.61 (0.07)	6

**Table 3.10.4** Great skua breeding success, grouped regionally 2001–2002: 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	2001 chicks fledged/AOT			2002 chicks fledged/AOT		
	Pairs <sup>n</sup>	Range	Overall	Pairs <sup>n</sup>	Range	Overall
Shetland	336 <sup>5</sup>	0.15–0.91	0.63	451 <sup>6</sup>	0.16–1.14	0.46
Orkney	9 <sup>1</sup>		0.33	10 <sup>1</sup>		1.1

### 3.11 Mediterranean gull *Larus melanocephalus*

#### *Breeding numbers and breeding success*

Mediterranean gull features in this report for the third year. An extreme rarity in Britain as recently as the 1930s, the 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, but it was not until 1979 that this became an annual event. Since then the number of nesting pairs has increased, a trend mirrored in other countries in central and Western Europe (Donald and Bekhuis 1993). The breeding population in the United Kingdom now probably numbers about 109 pairs, with a further three pairs in the Republic of Ireland.

More data for this species were received in 2002 than usual, due to comprehensive coverage for the *Seabird 2000* census (covering 1999-2002), and it is hoped that this may be continued in future years. Nevertheless, 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** - by far the species' stronghold in Britain and Ireland - the number of breeding pairs fell from 78 in 2001 to 50 in 2002, a decline of 36%. This decrease was due partly to an incomplete count at one of the larger colonies and to a high proportion of non-breeding at the Langstone Harbour colony. It appeared that a very dry spring resulted in low availability of earthworms - an important component in the Mediterranean gull's diet - on agricultural land around this site, and hence poor condition of potential breeding birds (Chris Cockburn, pers. comm.). At this site, 19 pairs fledged 11 young, a mean productivity of 0.58 chicks per pair, slightly above the productivity recorded there in 2001. At another colony in Hampshire, a maximum of 5-6 pairs were present in 2002 (5 pairs in 2001) but deserted the colony by early July, having raised no young.

No records of breeding were received from **eastern England** in 2002, where five pairs bred in 2001. Two pairs bred in **north-west England** in 2002, where breeding last occurred in 1999.

In **north-east Ireland**, two pairs bred at separate sites in 2002, the first time the species has bred successfully in Northern Ireland, having first attempted in 1995. One of the pairs raised a single chick. In **south-east Ireland**, three pairs bred in 2002, raising eight young, compared with one to two pairs (raising 1-2 chicks) in 2001. The species first bred in the Republic in 1996.

### 3.12 Black-headed gull *Larus ridibundus*

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

Black-headed gulls are highly mobile between breeding sites; hence, the changes in numbers at sample colonies shown in Table 3.12.1 are not necessarily representative of broader regional trends.

**Table 3.12.1** Regional population changes at monitored black-headed gull colonies, 2001-2002. Figures are breeding pairs, apparently incubating adults or apparently occupied nests in May-June. Regional samples of less than 100 pairs are excluded.

Region	2001	2002	2001-2002 % change
SW Scotland <sup>a</sup>	167	157	-6.0
NE England <sup>b</sup>	2,275	2,127	-6.5
E England <sup>c</sup>	2,645	2,999	+13.4
SE England <sup>d</sup>	15,220	13,590	-10.7
SW England <sup>e</sup>	56	128	+128.6

Colonies: <sup>a</sup> Eilean Inshaig, Sgeir na Caillich, Eilean an Ruisg, Airds Islet, Torinturk; <sup>b</sup> Farnes, Coquet Island; <sup>c</sup> Blakeney Point, Stiffkey Marshes, Havergate; <sup>d</sup> Elmley, Rye Harbour, North Solent NNR, Dungeness, Langstone Harbour; <sup>e</sup> Brownsea Island.

In **south-west Scotland**, overall numbers at monitored colonies declined slightly between 2001 and 2002. In the Mink-Seabird Project study area (between Mallaig and Tarbert on the Kintyre peninsula), overall breeding success from eight sites holding 162 pairs was 0.71 chicks per pair (Craik 2002). Comparing sites where mink were controlled against those with no mink control revealed

breeding performance of 1.22 and 0.51 chicks fledged per nest respectively suggesting a reduced productivity by 58%.

In **Shetland**, numbers increased on Fetlar to 24 pairs, although this is a low figure compared to that recorded in 1999 (102 pairs). However, the colony was abandoned by early June so no young were fledged (Smith and Bellamy 2002). On Mainland, numbers at South Whiteness decreased by 68%, while colonies in the Tingwall Valley failed for the third year in succession (Okill 2002b). In **Orkney**, available data suggested it had been a poor breeding season; 115 pairs on Egilsay (which held 101 pairs in 1996) failed to rear any young, while in Deerness only eight chicks fledged from a colony of 35 nests (Meek 2002).

In **north-east England**, overall numbers decreased. However, the fortunes of the two reporting colonies in the region – Coquet and the Farne Islands – varied considerably between 2001 and 2002. On Coquet Island, breeding numbers and breeding success decreased, although productivity was still close to average, while on the Farne Islands numbers and success both increased, although productivity was still below average, and half that of the former site.

In **east England**, numbers were stable or increased at Stiffkey Marshes, Blakeney Point and Havergate, resulting in an overall increase of 13.4% since 2001. In addition, numbers were also found to have increased at Minsmere between 2000 and 2002, by 80.7% from 316 to 571 pairs, and an estimated 50 pairs nested at Foulness Island. Productivity was low at all these sites, however, with few young fledging at Stiffkey due to fox predation and flooding, and only 30 young fledging at Blakeney Point due to predation by herring and lesser black-backed gulls (D. Wood, pers. comm.).

**Table 3.12.2** Population change of black-headed gull 2001-2002 and 1986-2001 at selected colonies mentioned in the text. Figures are breeding pairs, apparently incubating adults or apparently occupied nests in May-June.

Region/Site	2001	2002	% change 2001-2002	1986-2001 Mean (±s.d.)	No. of years
<b>Shetland</b>					
Fetlar	13	24	+84.6	35.0 (34)	6
South Whiteness	53	17	-67.9	-	1
<b>NE England</b>					
Coquet Island	2,218	2,045	-7.8	2,988.7 (979)	15
Farne Islands	57	82	+43.9	108.3 (67)	15
<b>E England</b>					
Stiffkey Marshes	2,500	2,500	0.0	-	1
Blakeney Point	30	310	933.3	-	1
Havergate	115	189	+64.4	422.5 (592)	4
<b>SE England</b>					
Elmley	3,500	3,500	0.0	3621.0 (701)	11
Rye Harbour	290	700	+141.4	396.4 (333)	13
Dungeness	185	60	-67.6	536.5 (373)	8
North Solent	8,066	6,524	-19.1	6,461 (1,588)	16
Langstone Harbour	3,179	2,906	-8.6	932.9 (1,214)	12
<b>SW England</b>					
Brownsea Island	56	128	+128.6	107.8 (70)	8

**Table 3.12.3** Breeding success (chicks fledged per pair) of black-headed gull 2001-2002 and 1986-2001 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	2001	2002	1986-2001	
			mean ( $\pm$ s.e.)	No. of years
<b>Shetland</b>				
Fetlar	0.15 (13)	0.00 (24)	0.38 (0.14)	6
<b>NE England</b>				
Coquet Island	1.70 (2,218)	1.40 (2,045)	1.37 (0.12)	6
Farne Islands	0.38 (57)	0.70 (82)	0.87 (0.32)	6
<b>E England</b>				
Blakeney Point	-	0.00 (310)	-	-
Minsmere	-	0.56 (571)	-	1
Havergate	-	0.26 (189)	-	-
Foulness Island	-	c.0.44 (c.50)	-	-
<b>SE England</b>				
Rye Harbour	1.55 (290)	c.1.07 (c.700)	0.68 (0.24)	8
Dungeness	-	c.0.17 (c.60)	0.39 (0.15)	5
Chichester	-	0.02 (171)	0.36 (0.20)	4
North Solent	c.2.00-3.00 (8,066)	0.00 (6,524)	c.1.88 (0.38)	6
Langstone Harbour	0.45 (3,179)	0.12 (2,906)	0.68 (0.14)	8
<b>SW England</b>				
Brownsea Island	c.0.22 (c.56)	0.23 (128)	-	1
<b>NW England</b>				
Rockcliffe Marsh	-	0.04 (70)	0.07	1

An overall decrease of 10.7% was recorded in **south-east England**, with low productivity again reported at several colonies. At North Solent, a count on 16<sup>th</sup> May found 6,524 pairs but by early June this colony had failed after bad weather, high tides and strong winds at critical times so that no young fledged (B. Lord, pers. comm.). Numbers also fell at Langstone Harbour, where breeding success was also below average. At Flander's Mare, there was no change in numbers since 2001, but nearby at Mockett's Saltmarsh numbers had fallen by 60.2% from 570 to 227 pairs since 2000. Of smaller colonies counted in 2001 and 2002, an increase was recorded at Rye Harbour, which was the only colony in the region to fledge more than one chick per pair, and a decrease was noted at Dungeness with low productivity also recorded there. Elsewhere in the region, the once large colony at Chichester Harbour, which contained 1,226 pairs in 1994 was found to hold 171 pairs in 2002, a decline of 86.0%. Only three chicks fledged at this site, with failure thought to have been caused by wet/poor weather; these were the first chicks to fledge here since 1993 (A. de Potier, pers. comm.).

In **south-west England**, numbers increased at Brownsea Island but productivity was again low due to flooding and high levels of predation (C. Thain, pers. comm.). These factors also resulted in low breeding success at Rockcliffe Marsh (**north-west England**), where only three young fledged from 70 nests. Numbers have declined at this site by 91.7% since 1990 when 850 pairs nested; breeding success was similarly low then at 0.07 chicks fledged per pair.

In **north-east Ireland**, 372 pairs nested on Big Copeland Island compared to 250 pairs recorded there in 2000, an increase of 48.8% over that period (N. McKee, pers. comm.).

### 3.13 Mew gull *Larus canus*

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

In 2002, the majority of data again came from the Mink-Seabird Project study area (Mallaig to Tarbert on the Kintyre peninsula) spread over **north-west** and **south-west** Scotland. Accurate counts undertaken there annually at 20 breeding sites since 1994 revealed numbers to be stable between 2001 and 2002. Overall, the total population has decreased by 17.2% since 1994 although numbers have fluctuated in this period. Continuing mink control efforts again enhanced breeding success in west coast colonies in 2002. At 13 colonies where mink were successfully controlled, 760 pairs fledged 508 chicks (mean of 0.67 per pair). This contrasted with 14 colonies with no (or unsuccessful) mink control, which fledged 89 chicks from 375 pairs, an average success rate of only 0.24 chicks per pair, implying that mink reduced productivity by 64% at unprotected colonies. The average apparent reduction in productivity due to mink predation over the years 1996-2002 was 57% (s.d.  $\pm 11\%$ ) (Craik 2002). Data from other colonies in western Scotland revealed record high counts at Handa, Eigg and on Sanda, although on Canna a count of eight pairs equalled the lowest figure recorded there (in 1994) (Swann 2002a).

**Table 3.13.1** Number of mew gull pairs in study colonies on the west coast of Scotland 1994-2002. Figures are sums of counts of pairs at 20 colonies in Argyll and Bute and southern Lochaber.

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2001-2002 % change
No.	1,081	1,015	821	805	929	913	979	900	895	-0.5

Colonies: Glas Eileanan, Eilean Inshaig, Tucker's Island, Sgeir na Caillich, Eilean an Ruisg, Eilean Mor, Glas Eilean, Kilmaronag, Aird's Point Islet, Bonawe Island, McCormaig Island, Eilean Fada, Ardrishaig, Sanda, Eilean Dubh, Eilean Gainimh, Sgeir Sallachain, Eilean Choinneich, Coruanan, Eilean Nan Gall.

**Table 3.13.2** Population changes of mew gull 2001-2002 and 1986-2002 at selected sites referred to in the text. Figures are apparently occupied nests.

Region/sites	2001	2002	% change 2001- 2002	1986-2001 Mean ( $\pm$ s.d.)	No. years
<b>SW Scotland</b>					
Sanda	55	76	+38.2	44 (7.2)	9
<b>NW Scotland</b>					
Handa	11	18	+63.6	12 (2.4)	16
Canna	10	8	-20.0	14 (2.8)	16
Eigg	71	72	+1.4	62 (7.4)	15
<b>North Scotland</b>					
Nigg	110	142	+29.1	50 (42.3)	12
Alness Point	80	80	0.0	89 (10.0)	6

In **Shetland**, visits to colonies to ring chicks indicated that many had a reasonable breeding season although most pairs in the Tingwall Valley again failed; this included the colony at Wormaldale Hill where many chicks were found dead and partially eaten, presumably by feral ferrets (Okill 2002b). On Fair Isle, nine pairs nested although, as in 2001, no young were successfully fledged (Shaw *et al.* 2002). In **Orkney**, at North Hill, Papa Westray 47 pairs nested in 2002, considerably more than the 27 pairs in 2001, although fewer than the 75 pairs in 1997. Productivity was measured at 0.81 chicks fledged per pair (cf. 1.33 in 1997) (Meek 2002). Elsewhere on Orkney, breeding success appeared to be poor with almost total failure recorded in Burray, South Ronaldsay and east Mainland colonies.



**Table 3.13.3** Breeding success (chicks per pair) of mew gulls 2001-2002 and 1986-2001 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	2001	2002	1986-2001	
			Mean ( $\pm$ s.e.)	No. years
<b>Shetland</b>				
Fair Isle	0.00 (8)	0.00 (9)	0.54 (0.11)	11
<b>North Scotland</b>				
Nigg	1.26 (70)	1.39 (67)	1.02(0.09)	6
Alness Point	0.00 (80)	0.00 (80)	0.70 (0.22)	6
<b>SE England</b>				
Dungeness	-	0.25 (12)	0.26 (0.12)	4

The colony at Nigg in **north Scotland** continued to increase in size, reaching its highest count since recording started there in 1990, when just six pairs were present. Breeding success in 2002 was also at an all-time high, with 93 young fledged from 67 monitored nests (Swann 2001b). Elsewhere in the region, the colony at Alness Point held 80 pairs (as in 2001) although accidental human disturbance again ensured no young were raised (A. Ramsey, pers. comm.).

At Dungeness (**south-east England**) productivity was low, with only three young fledging from the 12 pairs present (P. Troake, pers. comm.). In **north-east Ireland**, 179 pairs on Big Copeland Island in 2002 was the highest count recorded there, an increase of 62.7% since 2000 (when 110 pairs nested). Fourteen pairs also nested on nearby Old Lighthouse Island (N. McKee, pers. comm.).

### 3.14 Lesser black-backed gull *Larus fuscus*

*Between 2001 and 2002, large declines were noted in the regional populations of lesser black-backed gulls in north-east England (one colony only) and south-west Scotland, with an increase recorded in Wales. Little change in numbers was noted in other regions, although a decline was apparent in south-east Scotland since 1994. Productivity data suggest that 2002 was an average breeding season.*

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

In **south-west Scotland**, a decrease of 17.9% was noted between 2001 and 2002. In the Mink-Seabird Project study area (Mallaig to Tarbert on the Kintyre peninsula), at 10 colonies where breeding numbers and performance were estimated, c.612 pairs fledged a minimum of 288 young, equating to breeding success of 0.47 chicks fledged per pair. Mink were removed from one of these colonies and were active at a further two where no chicks fledged from a total of 41 nests (Craik 2002). In **north-west Scotland**, the population was stable between the two years with no notable change in numbers at either Eigg or Canna.

**Table 3.14.1** Regional population changes at monitored lesser black-backed gull colonies, 2001-2002. Figures are breeding pairs, apparently incubating adults or apparently occupied nests in May-June. Regional samples < 100 pairs are excluded.

Region/site	2001	2002	% change 2001-2002
SW Scotland <sup>a</sup>	924	759	-17.9
SE Scotland <sup>b</sup>	1,349	1,365	+1.2
NE England <sup>c</sup>	221	117	-47.1
Wales <sup>d</sup>	16,910	18,942	+12.0

Colonies: <sup>a</sup> Tarbet Island, Reisa Mhic Phaidean, Eilean Gamhna, Eilean Mor, Eilean na Cille, Eilean Eoghainn, Eilean a Bhuic, Burnt Isles, Sanda; <sup>b</sup> Isle of May, Haystack, Carr Craig, The Lamb, Inchmickery, Fidra; <sup>c</sup> Coquet; <sup>d</sup> Caldey, Stackpole, Skomer, Skokholm, Bardsey, South Stack, Elegug Stacks and nearby coast.

In **south-east Scotland**, although the regional total changed little between 2001 and 2002, longer term data show a decline. Nine of the Forth Islands counted in 1994 and 2002 reveal that numbers fell by 9.5% over the period from 5,878 pairs to 5,322. In addition, although numbers were stable on the Isle of May between 2001 and 2002, a 5.7% decrease was noted at this site since 1994. Productivity data from the Isle of May indicated a successful breeding season in 2002; 1.30 chicks fledged per nest was well above the long-term mean. On the Bass Rock, the population appears to have undergone a steep decline from 25 pairs in 2000 to one in 2002.

In **north-east England**, after the 20% increase recorded between 2000 and 2001, numbers on Coquet Island declined by 47.1% to 117 pairs. At Orford Ness (**east England**), although numbers fell from an estimated 23,500-24,000 pairs in 2001 to 6,500 pairs, this is likely to be attributable to increased fox activity rather than a genuine decline. Predator control could not be carried out in 2002 and it is anticipated numbers will return to normal levels in 2003 (D. Cormack, pers. comm.). Elsewhere, a large decrease was noted in the colony at Blakeney Point, where nesting is controlled for tern conservation.

**Table 3.14.2** Population changes of lesser black-backed gull 2001-2002 and 1986-2001 at selected colonies referred to in the text. Figures are breeding pairs, apparently incubating adults or apparently occupied nests in May-June.

Region/site	2001	2002	% change 2001-2002	1986-2001 Mean (±s.d.)	No. years
<b>SW Scotland</b>					
Sanda	65	60	-7.7	87.3 (31)	9
<b>NW Scotland</b>					
Eigg	35	37	+5.7	36.7 (12)	15
Canna	43	42	+2.3	37.6 (5)	16
<b>SE Scotland</b>					
Isle of May	1,203	1,198	-0.3	1,101.3 (429)	16
<b>NE England</b>					
Coquet Island	221	117	-47.1	84.1 (80)	10
<b>E England</b>					
Blakeney Point	171	5	-97.1	51.7 (74)	6
<b>Wales</b>					
Skomer	13,019	15,185	+16.6	14,538.5 (2,520)	16
Skokholm	2,450	2,460	+0.4	3,226.5 (668)	15
South Stack	84	125	+48.8	52.9 (54)	12
Bardsey	634	612	-3.5	341.8 (141)	16
Caldey	670	507	-24.3	324.3 (203)	15
<b>NE Ireland</b>					
Old Lighthouse Island	180	190	+5.6	210.0 (49)	7

In **Wales**, the regional total increased by 12.0%. All colonies except Bardsey and Caldey reported greater numbers than in 2001. At the largest colony, on Skomer, 15,185 pairs was the highest count recorded since 1995 (Brown and Duffield 2002). It appeared to be a poor breeding season at Skomer and Skokholm with below average success recorded at both, although on Bardsey productivity was the highest recorded for the island (Stansfield 2002).

**Table 3.14.3** Breeding success (chicks fledged per pair) of lesser black-backed gull 2001-2002 and 1986-2001 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/Site	2001	2002	1986-2001	
			Mean ( $\pm$ s.e.)	No. of years
<b>SE Scotland</b>				
Isle of May	1.32 (264)	1.30 (148)	0.86 (0.07)	13
<b>Wales</b>				
Skokholm	0.23 (2,450)	0.04 (2,460)	0.20 (0.02)	8
Skomer	0.28 (13,019)	0.14 (15,185)	0.24 (0.05)	13
Bardsey	0.71 (634)	0.99 (612)	0.59 (0.08)	6

In **north-east Ireland**, the number was reasonably stable on Old Lighthouse Island between 2001 and 2002, although on nearby Big Copeland Island it dropped by 41.9% since 2000 from 310 pairs to 180. On Lambay (**south-east Ireland**), the number declined from 309 pairs in 1999 to 216 pairs in 2002, a drop of 30.1%. However, it is thought that grass-cutting during the first week of June 2002, prior to the survey, may have destroyed a number of nests as this was carried out in the stronghold of the lesser black-backed gull colony (Madden and Newton 2002). With numbers of all three large gull species nesting on the island in decline, it has been recommended that grass-cutting be delayed until early July each year when chicks ought to be mobile enough to escape from an approaching tractor and mower.

The following data relate to mixed colonies of lesser black-backed and herring gulls. The annual census of the large inland colony at Tarnbrook Fell (**north-west England**) found an estimated 12,088 nests with eggs (cf. 18,080 in 2001, 18,993 in 2000, 17,155 in 1999 and 14,129 in 1998) of which c. 97-98% were lesser black-backed gulls and the remainder herring gulls (Sowter 2002). However, this figure should be treated as a minimum as it is thought that a period of bad weather delayed the return of gulls to the colony by at least two weeks. Application of a conversion factor as used between 1990 and 1997 to allow for missed and late nests gives a maximum estimate of 17,545 breeding pairs. Elsewhere in the region, the colony at Rockcliffe Marsh was estimated to contain a minimum of 10,000 pairs, suggesting little change from 1999 and 2000 levels, with sample counts again indicating a ratio of 3:1 in favour of lesser black-backed gulls (M. Carrier, pers. comm.). At South Walney, the colony was estimated to have declined by 10.3% to 25,068 pairs since 2000 (27,950 pairs). The ratio of lesser black-backed:herring gulls calculated from sample areas was estimated at 4.2:1, suggesting the colony held 20,244 and 4,820 pairs of lesser black-backed and herring gulls respectively. In **north-east England**, a total of 1,057 pairs was counted in the mixed colony on the Farne Islands, only one pair less than that recorded in 2001 (Walton 2002). This comprised 533 pairs of lesser black-backed gulls and 524 pairs of herring gulls. Comparing these figures with those of 1986, when the colony held 1,283 pairs, indicates a decline of 17.6% since then with a decrease in the ratio of lesser black-backed:herring gulls from 4:1 to almost 1:1.

### 3.15 Herring gull *Larus argentatus*

*Few colonies are counted annually, but regional data collected between 2001 and 2002 indicate that coastal populations declined. However, population trends at individual colonies within regions varied, so data from small samples of colonies are not necessarily indicative of widespread changes.*

*Breeding numbers and breeding success (Tables 3.15.1, 3.15.2 and 3.15.3)*

The only region where numbers increased between 2001 and 2002 was **north Scotland**, where only one colony (Nigg) was sampled. At this colony, where the majority of birds nest on the roofs of large work sheds, numbers increased by 28.7% to 269 pairs (Swann 2002b).

In both **north-west** and **south-west Scotland**, overall numbers at regularly monitored colonies decreased. In the Mink-Seabird Project study area (Mallaig to Tarbert on the Kintyre peninsula), a total of 7,314 pairs nested at 67 sites (Craik 2002). Colonies holding more than ten pairs (47 sites) were divided into two groups: i) those with active mink control (n=9) and ii) those without mink control (n=38). Breeding performance at sites where active mink control was carried out measured 0.93 chicks per pair from 1,294 pairs. This compared with 0.65 chicks fledged per pair from 5,571 pairs at colonies with no mink control indicating that mink lowered herring gull productivity by 30%. The average reduction in productivity over the last six years was 44% (s.d.  $\pm 17\%$ ) implying that mink are halving the breeding success of herring gulls (Craik 2002). Elsewhere, decreases were noted on Lunga and Canna. Numbers at the latter site fell to their lowest level since 1986 - a continuation of a long-term decline that started in 1989 - and no chicks fledged (Swann 2002a). Increases in number were noted on Sanda and on Eigg.

**Table 3.15.1** Regional population changes at monitored herring gull colonies, 2001-2002. Figures are breeding pairs or apparently occupied nests in May-June. Regional samples < 200 pairs are excluded.

Region/site	2001	2002	% change 2001-2002
SW Scotland <sup>a</sup>	7,109	6,704	-5.7
NW Scotland <sup>b</sup>	2,668	2,326	-12.8
N Scotland <sup>c</sup>	209	269	+28.7
NE Scotland <sup>d</sup>	272	177	-34.9
SE Scotland <sup>e</sup>	4,800	4,409	-8.2
Wales <sup>f</sup>	3,787	3,284	-13.3

Colonies: <sup>a</sup> Lunga, Sanda, Mull of Galloway, 38 islets in Argyll and Bute; <sup>b</sup> Handa, Canna, Eigg, 18 islets in Lochaber; <sup>c</sup> Nigg; <sup>d</sup> Sands of Forvie NNR; <sup>e</sup> Isle of May, Inchgarvie, Inchmickery, Eyebroughty, Carr Craig, Fidra, Haystack, The Lamb, St Abb's Head; <sup>f</sup> Caldey, Elegug Stacks and nearby coast, Skokholm, Bardsey, South Stack.

In **Shetland**, a small decline was noted on Noss for the second successive year but productivity was exceptional compared to previous years; 46 fledged young represented 0.78 chicks per pair (*cf* 0.30 and 0.31 per pair in 2000 and 2001 respectively) (Gabb and Thomas 2002). Only two pairs were found nesting in the once large colony at Hildasay, which held in excess of 300 pairs as recently as 1998 (Okill 2002b).

**Table 3.15.2** Population changes of herring gull 2001-2002 and 1986-2001 at selected colonies referred to in the text. Figures are breeding pairs or apparently occupied nests in May-June

Region/site	2001	2002	% change 2001-2002	1986-2001	
				Mean ( $\pm$ s.d.)	No. years
<b>SW Scotland</b>					
Lunga	88	63	-28.4	77.9 (13)	9
Sanda	700	855	+22.1	818.0 (125)	6
<b>NW Scotland</b>					
Canna	1,006	862	-14.3	1,293.1 (150)	15
Eigg	316	335	+6.0	401.5 (109)	15
<b>Shetland</b>					
Noss	63	59	-6.4	75.0 (14)	16
<b>N Scotland</b>					
Nigg	209	269	+28.7	45.8 (79)	12
<b>NE Scotland</b>					
Sands of Forvie	272	177	-34.9	453.8 (112)	5
<b>SE Scotland</b>					
Isle of May	2,845	2,367	-16.8	2,253.4 (604)	16
St Abb's Head	301	257	-14.6	403.1 (161)	16
<b>NE England</b>					
Coquet Island	31	20	-35.5	23.8 (15)	9
Longnewton Reservoir	33	44	+33.3	26.3 (8)	7
Saltburn	33	33	0.0	149.1 (65)	14
<b>SE England</b>					
Dungeness	51	55	+7.8	110.5 (12)	2
<b>Wales</b>					
Caldey Island	2,076	1,638	-21.1	1,229.3 (477)	15
Stackpole Head	124	128	+3.2	67.5 (23)	16
Elegug Stacks	130	105	-19.2	103.6 (20)	8
Skokholm	385	243	-36.9	339.0 (54)	16
Bardsey	663	660	-0.4	394.8 (142)	16
South Stack	297	413	+39.1	304.7 (131)	9
<b>NE Ireland</b>					
Lighthouse Island	80	87	+8.8	95.0 (10)	5

At the Sands of Forvie NNR (**north-east Scotland**), after the 44.3% decline documented there between 2000 and 2001, a further drop in numbers was noted to less than one-third of the peak count of 575 pairs recorded as recently as 1998 (Milne 2002).

In **south-east Scotland**, overall numbers fell by 8.2% since 2001, with decreases recorded from seven of nine reporting colonies, although only at the Isle of May and St Abb's Head were declines greater than 10%. Only on Fidra did numbers increase, by 54.3% to 1,296 pairs which perhaps suggests some movement of birds between nearby islands. Longer-term data show the extent of the decline in the south-east: at ten of the Forth Islands counted in 1994 and 2002, numbers fell by 33.8% from 10,673 pairs to 7,067. In addition, a decline of 58.6% was noted at the Bass Rock since 2000, where numbers fell from 210 pairs to 87. Productivity on the Isle of May was estimated at 0.61 chicks fledged per nest from a sample of 195 nests, just below the average figure for the site (Moeller-Holtkamp 2002).

In **north-east England**, no overall change in numbers was apparent between 2001 and 2002 in the three small colonies at Coquet Island, Longnewton and Saltburn, although the annual changes varied at each. Numbers at Saltburn have been declining since the peak count of 270 pairs in 1992. However, in the larger colony at Boulby Cliffs, numbers have increased by 24.3% to 435 pairs since the last comparable count in 1999 (M. Blick, pers. comm.). In **east England**, a large decline at Orford Ness, from an estimated 6,800 pairs in 2001 to 2,575 pairs in 2002, is likely to be attributable to increased fox activity rather than a genuine decline. Predator control could not be carried out in 2002

and it is anticipated numbers will return to normal in 2003 (D. Cormack, pers. comm.). Numbers appeared to be stable in the small colony at Dungeness (**south-east England**).

At Durlston Head (**south-west England**), numbers declined to 65 pairs, a similar figure to that recorded in 2000 (67 pairs). This suggests that the increase noted in 2001 was a direct result of a lack of human disturbance because of footpath closure due to foot-and-mouth (Morrison 2002). Numbers remained stable at nearby Ballard, where breeding success was 1.33 chicks per pair (*cf.* 1.73 in 2001).

A decline was also evident in **Wales** between 2001 and 2002, with losses of 19-37% at Caldey, Elegug Stacks and Skokholm being particularly noteworthy. In contrast, the population at South Stack increased over this period by 39.1% (D. Bateson, pers. comm.). Numbers were little changed at Bardsey and Stackpole Head. Breeding success was the lowest on record on both Skomer and Skokholm, although herring gulls on Bardsey had their most successful season since 1997 (Stansfield 2002).

In **north-east Ireland**, a small increase was noted at Old Lighthouse Island between 2001 and 2002. A larger increase, of 61.2% to 258 pairs, was evident on Big Copeland Island since the last comparable count in 2000 (N. McKee, pers. comm.). Data from the Isle of Muck suggest a serious long-term decline; only 18 pairs were counted in 2002, compared with 184 pairs in 1995 which itself is a fraction of 1,500-2,000 pairs noted there in 1982 (A. Upton, pers. comm.). On Lambay (**south-east Ireland**), numbers declined between 1999 and 2002 by 80.2%, from 1,806 to 358 pairs. This is a continuation of a long-term decline from 5-6,000 pairs in 1987 (Madden and Newton 2002).

In **north-west England**, numbers could only be compared against 2000 counts at St Bee's Head and the Calf of Man, due to a lack of coverage in 2001 because of foot-and-mouth. Large decreases were reported at each site, of 36.6% to 345 pairs at the former and of 48.0% to 435 pairs at the latter.

**Table 3.15.3** Breeding success of herring gulls (chicks per pair) 2001-2002 and 1986-2001 at selected colonies mentioned in the text.

Region/site	2001	2002	1986-2001	
			Mean ( $\pm$ s.e.)	No. years
<b>NW Scotland</b>				
Canna	0.10	0.00	0.85 (0.18)	12
<b>Shetland</b>				
Noss	0.31	0.78	0.30 (0.01)	2
<b>SE Scotland</b>				
Isle of May	0.91	0.61	0.67 (0.06)	5
<b>Wales</b>				
Skokholm	0.89	0.21	0.86 (0.11)	8
Skomer	0.88	0.23	0.86 (0.11)	7
Bardsey	1.28	1.31	1.23 (0.16)	6
<b>SW England</b>				
Ballard	1.73	1.33	-	1

### 3.16 Great black-backed gull *Larus marinus*

Between 2001 and 2002, increases and decreases recorded in the regions were generally of the order of  $\pm 5\%$ . Larger changes were evident in Orkney (an increase) and north-west England (a decrease), regions with just one reporting colony each. The few productivity data received suggest that 2002 was moderately successful, with above average success at most colonies.

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

At monitored colonies in **south-west** and **north-west Scotland**, there were decreases of 6.2% and 8.3% in breeding numbers respectively between 2001 and 2002 (Table 3.16.1), similar to the decreases recorded between 2000 and 2001 (Mavor *et al.* 2002). In the Mink-Seabird Project study area (Mallaig to Tarbert on the Kintyre peninsula), 606 pairs were found at 61 sites. At 59 sites where productivity was monitored, breeding success averaged 0.96 chicks per pair across c. 593 nests. Mink were active at 13 out of 58 sites where no control was carried out, with only 18 young fledging from 54 nests at mink-depredated sites (Craik 2002). Outwith this study area, a large decrease was noted on Lunga where numbers fell by 25 pairs. Little change was recorded in numbers breeding on Sanda, Eigg, Handa and Canna. However, at the last site, breeding success was the poorest on record, possibly due to a period of cool and unsettled weather from late May to July (Swann 2002a).

In **Shetland**, there was little overall change in numbers. However, on Noss numbers fell to their lowest level, with only 49 pairs recorded. Limited productivity data were available from this site, as long vegetation in the main colony hampered chick counting, but figures suggest breeding success may have been on a par with previous years (Gabb and Thomas 2002). On Mousa, 16 AON were found compared with only six in 2001. On Foula, examination of 110 pellets collected in the loafing area near the mouth of the Daal Burn revealed that 43% comprised auk eggs or chicks ( $n = 30$  and 17 respectively). This is in contrast to previous years as pellets from this area usually consist of whitefish bones and otoliths (Furness 2002). In **Orkney**, figures were available only from North Hill, Papa Westray, where numbers increased by 62.5% to 78 pairs and breeding success was estimated at 0.79 chicks per pair. Casual observation of other colonies at Swona and Mull Head suggested an average breeding season (Meek 2002).

**Table 3.16.1** Regional population changes at monitored great black-backed gull colonies, 2001-2002. Figures are breeding pairs or apparently occupied nests in May-June. Regional samples of < 50 pairs are excluded.

Region	2001	2002	2001-2002 % change
SW Scotland	634	595	-6.2 <sup>a</sup>
NW Scotland	228	209	-8.3 <sup>b</sup>
Shetland	68	65	-4.4 <sup>c</sup>
Orkney	48	78	+62.5 <sup>d</sup>
N Scotland	164	173	+5.5 <sup>e</sup>
Wales	160	170	+6.2 <sup>f</sup>
NW England	55	37	-32.7 <sup>g</sup>

Colonies: <sup>a</sup> Sanda, Lunga, 40 islets in Argyll and Bute; <sup>b</sup> Eigg, Canna, Handa, eight islets in Lochaber; <sup>c</sup> Noss, Mousa; <sup>d</sup> North Hill; <sup>e</sup> Nigg oil terminal; <sup>f</sup> Skomer, Skokholm, Middleholm, Stackpole Head plus Elegug Stacks, South Stack, Bardsey; <sup>g</sup> Rockcliffe Marsh.

In **north Scotland**, the colony at Nigg increased to 173 pairs, having grown in every year (bar one) since its establishment in 1990 when it numbered four pairs (Swann 2002b). Productivity at this site was high at 1.95 chicks from 134 monitored nests. In **south-east Scotland**, although numbers on the Isle of May decreased by 25.9%, combined data for this site and several islands in the Firth of Forth

revealed only a small decrease, from 35 to 32 pairs since 2001. In the small colony on the Farne Islands (**north-east England**), eight pairs were counted; the previous peak counts at this site were three pairs in both 1994 and 1999 (Walton 2002).

In **south-west England**, breeding success improved on that recorded in 2001 at the two small colonies at Ballard and south-east Purbeck (Morrison 2002). In **Wales**, overall numbers at monitored colonies increased slightly since 2001. Numbers increased on Skomer and nearby Middleholm, with the population at the former site at its highest level since 1981, although this is low compared with the early 1960s when the colony numbered almost 300 pairs (Brown and Duffield 2002). Productivity from 25 monitored nests on Skomer was close to average. A slight decline was recorded on Skokholm, where productivity was also below average. On Bardsey, no monitoring could be carried out on Ynys Gwylan Fawr due to bad weather, although three pairs nesting on the main island raised three young each (Stansfield 2002).

In **north-west England**, numbers declined by 32.7% at Rockcliffe Marsh. High tides washed out 26 nests early in the breeding season, but the remaining 11 nests fledged 23 young. Twelve pairs re-laid and fledged a further 22 young (M. Carrier, pers. comm.).

On Lambay Island (**south-east Ireland**), 110 pairs were counted, a decrease of 43% from 193 pairs in 1999. However, it is thought that grass-cutting during the first week of June 2002, prior to the survey, may have destroyed a number of nests (Madden and Newton 2002). Numbers of all three large gull species nesting on the island are in decline, so it has been recommended that grass-cutting be delayed until early July when chicks ought to be mobile enough to escape from an approaching tractor and mower.

**Table 3.16.2** Population changes at selected great black-backed gull colonies referred to in the text. For details of numbers found in the Mink-Seabird Project study area refer to the text.

Region/Site	2001	2002	% change 2001-2002	1986-2001 Mean ( $\pm$ s.d.)	No. of years
<b>SW Scotland</b>					
Sanda	33	36	+9.1	34.9 (8.2)	10
Lunga	74	49	-33.8	55.4 (13.8)	9
<b>NW Scotland</b>					
Eigg	14	11	-21.4	17.1 (5.4)	15
Canna	72	68	-5.6	78.6 (9.6)	16
Handa	36	35	-2.8	36.9 (11.6)	14
<b>Shetland</b>					
Noss	62	49	-21.0	71.1 (13.2)	16
Mousa	6	16	+166.7	-	1
<b>Orkney</b>					
North Hill	48	78	+62.5	66.5 (26.2)	2
<b>N Scotland</b>					
Nigg	164	173	+5.5	88.4 (50.6)	12
<b>SE Scotland</b>					
Isle of May	27	20	-25.9	11.8 (8.0)	11
<b>NE England</b>					
Farne Islands	1	8	+700.00	2.0 (0.6)	9
<b>Wales</b>					
Skokholm	53	49	-7.5	35.6 (12.8)	12
Skomer	69	79	+14.5	48.9 (15.2)	16
Middleholm	29	32	+10.3	36.9 (15.8)	8
<b>NW England</b>					
Rockcliffe Marsh	55	37	-32.7	19.3 (22.3)	6



**Table 3.16.3** Breeding success of great black-backed gull (chicks fledged per pair) 2001-2002 and 1986-2001 at selected colonies mentioned in the text.

Region/Site	2001	2002	1986-2001 mean ( $\pm$ s.e.)	No. of years
<b>NW Scotland</b>				
Canna	0.34 (32)	0.09 (33)	1.13 (0.20)	5
<b>Shetland</b>				
Noss	0.46 (62)	0.57 (7)	0.54 (0.08)	2
<b>Orkney</b>				
North Hill, Papa Westray	-	0.79 (78)	-	-
<b>N Scotland</b>				
Nigg	0.77 (143)	1.95 (134)	1.69 (0.15)	11
<b>SW England</b>				
Ballard	1.00 (12)	1.83 (12)	-	1
South-east Purbeck	1.00 (1)	2.00 (1)	-	1
<b>Wales</b>				
Skokholm	1.15 (53)	1.09 (49)	1.20 (0.10)	10
Skomer	1.36 (25)	1.28 (25)	1.21 (0.08)	6
Bardsey	0.00 (2)	3.00 (3)	1.39 (0.38)	5
<b>NW England</b>				
Rockcliffe Marsh	0.82 (55)	1.22 (37)	0.69 (0.13)	2

### 3.17 Black-legged kittiwake *Rissa tridactyla*

*Between 2001 and 2002, overall breeding numbers declined slightly in most regions. Increases were recorded in three regions, with a substantial increase noted in south-west Scotland. Overall productivity was higher than that recorded in 2001, averaging 0.66 chicks fledged per breeding pair at 40 colonies, although this was still below the long-term mean. In 39 colonies monitored in both 2001 and 2002, there was a non-significant increase in mean breeding success of 0.06 chicks fledged per pair.*

*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.

The long-term decline of the **Shetland** population continues. The total population (including Fair Isle) was estimated at only 15,157 AON, a 72% decrease since 1981 (Heubeck 2003). Short-term data illustrates the size of the decline recorded in recent years. Eighteen colonies counted in 1999 and 2002 decreased by 39.6% from 4,038 to 2,437 AON over that period (Heubeck 2003). A complete count of Foula produced 1,298 AON compared to 1,934 AON in 2000, a drop of 32.9% (S. Gear, pers. comm.). Furthermore, data from productivity plots and those few colonies counted in both 2001 and 2002 suggest numbers declined by 32.3% between these years. A decrease was also recorded at North Hill, Papa Westray (**Orkney**) where numbers are now less than one-quarter of the 1994 total of 652 AON.

**Table 3.17.1** Regional population changes at monitored black-legged kittiwake colonies, 2001-2002 (apparently occupied nests in late May or June) and 1986-2001 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 1986-2001 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.

Region	2001	2002	2001-2002	% annual change
SW Scotland <sup>a</sup>	1,315	1,516	+15.3	+3.2** 1986-2001
NW Scotland <sup>b</sup>	1,933	1,974	+2.1	-1.6* 1986-2001
Shetland <sup>c</sup>	1,747	1,183	-32.3	-9.9*** 1986-2002
NE Scotland <sup>d</sup>	903	809	-10.4	-9.0 ** 1992-2001
SE Scotland <sup>e</sup>	13,488	14,576	+8.1	-3.3** 1986-2001
NE England <sup>f</sup>	8,522	8,211	-3.6	-1.1 n.s. 1986-2001
SE England <sup>g</sup>	1,229	1,121	-8.8	-3.7** 1986-2001
Wales <sup>h</sup>	3,428	3,240	-5.5	-2.1*** 1986-2001
SE Ireland <sup>i</sup>	857	834	-2.7	+0.7 n.s. 1986-2001

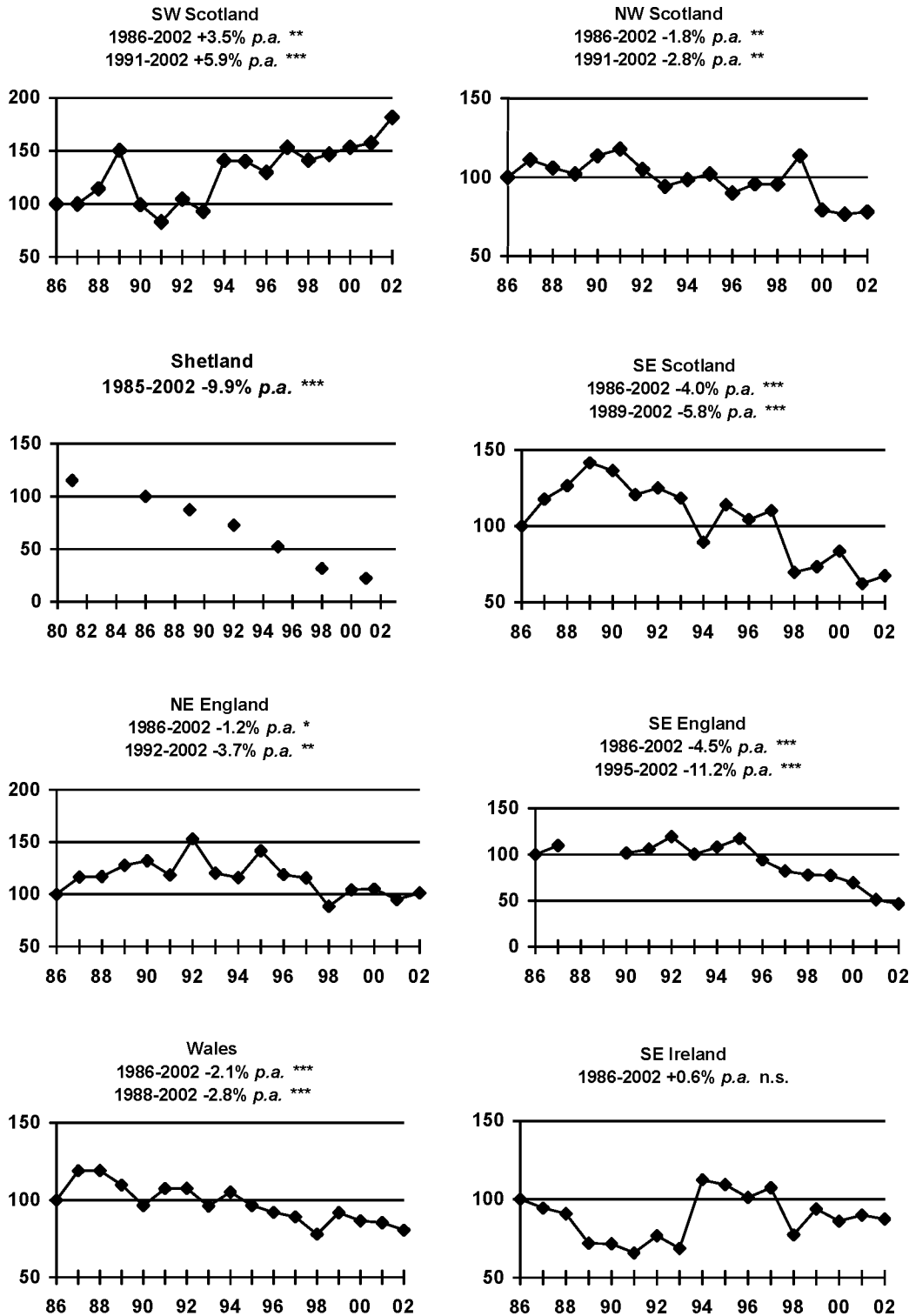
Colonies: <sup>a</sup> Lunga, Colonsay, Mull of Galloway; <sup>b</sup> Canna, Handa (productivity plots); <sup>c</sup> Sumburgh Head, Noness, Ramna Geo, Westerwick, Hermaness, Foula, Fair Isle (all productivity plots), Eshaness, Strandburgh Ness, Troswick Ness, Boddam; <sup>d</sup> Covesea, Portknockie, Sands of Forvie NNR; <sup>e</sup> Isle of May, Inchkeith, Craigleith, The Lamb, Fidra, Inchcolm, Bass Rock, St Abb's Head; <sup>f</sup> Farne Islands, Coquet, Saltburn; <sup>g</sup> Fan Bay-West Langdon Cliffs; <sup>h</sup> Great Ormes Head, South Stack, Bardsey, Skomer, Elegug Stacks; <sup>i</sup> Dunmore East, Portlally.

The pattern of decline since the early 1990s is also a common feature of east coast colonies. A new low figure was recorded from North Sutor (**north Scotland**) where numbers declined for the fifth consecutive year (Swann 2002b). In **north-east Scotland**, numbers at the Sands of Forvie were also at their lowest level and less than a third of the 1992 total (Milne 2002). Numbers at Covesea, where the decline has been less marked with the current population still c.68% of that recorded in 1995, were similar to 2001. In contrast, the small colony at Portknockie is one of the few where numbers have not declined over the last decade; the 2002 figure is the second highest to be recorded there.

In **south-east Scotland**, an overall increase was recorded between 2001 and 2002; however, a decline has been evident since 1989, albeit with fluctuations. Considering individual colonies, only at Craigleith (Forth Islands) did numbers decrease between 2001 and 2002, but the 2002 figures at this site and on Inchkeith, Isle of May, Bass Rock and St Abb's Head are among the lowest three counts at each.

In **north-east England**, the decline noted since numbers peaked in 1992 continued, although the rate of decline has not been as significant as that recorded in other regions. Numbers decreased on the Farne Islands, where only in 1986 and 1998 have fewer birds nested. Numbers at Coquet, where the small colony has been increasing since 1994, reached a new peak in 2002. At Boulby Cliffs, numbers had increased slightly by 4.7% to 3,350 since the last comparable survey in 1999 (M. Blick, pers. comm.). At South Foreland (**south-east England**), numbers fell for the seventh year in a row to a new low figure although the decrease was less than the average annual rate since 1995 which measures 11.2%. In other eastern and southern regions, numbers were stable in the small colonies at Lowestoft (**east England**) and Blacker's Hole (**south-west England**) between 2001 and 2002 but the general picture in these regions is also one of decline.

Decreases were also evident in most colonies to the west of Britain, although those colonies in west Scotland tended to fair better.



**Figure 3.17.1** Regional population indices for breeding black-legged kittiwakes, 1986-2002 (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, \*  $P < 0.05$ , \*\*  $P < 0.01$ , \*\*\*  $P < 0.001$ . 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 **Wales**, the decrease in numbers between 2001 and 2002 reflects the significant decline in black-legged kittiwake numbers that has occurred in this region since 1988. Numbers at Skomer and Elegug Stacks are now at their lowest levels since 1986. After the low count of 175 nests on Bardsey in 1998, which was the lowest count there since 1986, numbers have increased and remained fairly stable over the last three seasons. Increases were also noted at Great Ormes Head since 2001, and at Little Ormes Head since 2000 where 617 nests represented an increase of 6.0%; numbers have been rather variable at both colonies since monitoring began. At St Bee's Head (**north-west England**), 997 nests was the lowest figure to be recorded there since 1989, and represented a 25.6% decrease since 2000.

**South-west Scotland** is one of the few regions to show a significant increasing trend in black-legged kittiwake numbers, with an average annual rate of increase of 5.9% since 1991. In 2002, a large increase was noted at the Mull of Galloway, where only in 1997 have greater numbers nested. Numbers also increased at the smaller colony on Colonsay, with a small proportional decrease noted on Lunga. In **north-west Scotland**, there was little change in overall numbers, or in the populations at Canna and Handa, although the regional total has declined significantly since 1991.

Few data were received from Ireland. On the Isle of Muck (**north-east Ireland**), the colony increased by 25.0% from 240 to 300 AON between 2000 and 2002. In **south-east Ireland**, numbers were relatively stable between 2001 and 2002 with little change in overall numbers since 1994.

**Table 3.17.2** Population changes of black-legged kittiwake 2001-2002 and 1986-2001 at selected sites referred to in the text. Figures are apparently occupied nests.

Region/Site	2001	2002	% Change 2001-2002	1986-2001	
				Mean ( $\pm$ s.d.)	No. of years
<b>SW Scotland</b>					
Mull of Galloway	213	422	+98.1	307 (66)	15
Lunga	1,010	986	-2.4	740 (138)	9
Colonsay	92	108	+17.4	99 (24)	7
<b>NW Scotland</b>					
Canna	1,179	1,264	+7.2	966 (188)	16
Handa	754	710	-5.8	750 (48)	4
<b>Orkney</b>					
North Hill, Papa Westray	148	125	-15.5	351 (248)	4
<b>North Scotland</b>					
North Sutor	367	332	-9.5	630 (177)	7
<b>NE Scotland</b>					
Covesea	365	369	+1.1	283 (123)	11
Portknockie	118	110	-6.8	85 (34)	7
Sands of Forvie	420	330	-21.4	770 (187)	14
<b>SE Scotland</b>					
Isle of May	3,639	3,666	+0.7	6,016 (1,536)	16
Firth of Forth islands	1,115	1,246	+8.2	1,670 (424)	8
Bass Rock	670	774	+15.5	1,913 (932)	5
St Abb's Head	8,028	8,890	+10.7	13,765 (3,244)	16
<b>NE England</b>					
Farnes	5,781	5,055	-12.6	5,763 (540)	16
Coquet	66	81	+22.7	52 (17)	8
<b>E England</b>					
Lowestoft	157	155	-1.3	150 (50)	15
<b>SE England</b>					
South Foreland	1,229	1,121	-8.8	2,261 (471)	14

**Table 3.17.2** (continued)

Region/Site	2001	2002	% Change 2001-2002	1986-2001	
				Mean (±s.d.)	No. of years
<b>SW England</b>					
Blacker's Hole	55	54	-1.8	60 (20)	11
<b>Wales</b>					
Skomer	2,236	1,863	-16.7	2,301 (176)	16
Elegug	126	91	-27.8	293 (139)	12
Bardsey	288	292	+1.4	233 (48)	16
Great Ormes Head	778	994	+27.8	1,133 (266)	14
<b>SE Ireland</b>					
Dunmore	838	809	-3.5	945 (128)	16
Portally	19	25	+31.6	66 (40)	16

*Breeding success* (Tables 3.17.3 and 3.17.4, Figure 3.17.2)

Although the overall productivity of black-legged kittiwakes improved on that recorded in 2001 it was still generally a poor breeding season for the species. Breeding success in 2002 averaged 0.66 (s.e.  $\pm$  0.07) chicks fledged per breeding pair at 40 colonies, below the mean for the period 1986-2001 of 0.72 (s.e.  $\pm$  0.03) at 30 to 61 colonies monitored annually. In 39 colonies monitored in both 2001 and 2002, there was a non-significant increase in mean breeding success of 0.06 (s.e.  $\pm$  0.05) chicks fledged per pair. However, these mean productivity estimates for the UK contain marked regional variation.

In **Shetland**, although breeding performance was not as poor as it had been in 2001, success was still low at most colonies. Of eight colonies monitored during 2002, only at Hermaness was breeding success close to average; productivity was below average at all other colonies and once again no chicks fledged at Westerwick or Sumburgh Head. Detailed study of the SOTEAG productivity monitoring plots at Sumburgh Head, Nones, Ramna Geo and Westerwick showed that the number of nests in plots was lower than normal and that the percentage of nests being incubated was also low. Unlike in 2001, when rapid breeding failure ensued after chicks hatched (perhaps due to a shortage of small sandeels at that time), in 2002 most losses occurred before hatching, suggesting a shortage of sandeels to sustain adults in the early part of the breeding season (Heubeck 2003). The number of nests in productivity plots also declined severely on Noss and Fair Isle. The return rate of colour ringed birds to the latter colony between 2002 and 2001 was also exceptionally low, with a rate of 0% recorded (but note that the 'pool' of colour ringed birds from which this figure was derived was very small) (Shaw *et al.* 2002).

Productivity was also low in many other regions bordering the northern North Sea; overall breeding success in **north, north-east and south-east Scotland** was lower than in 2001, with below average figures recorded from the majority of individual colonies in 2002. Colonies in **north-east and east England**, where regional values were close to that recorded in 2001, had a more successful breeding season than more northerly colonies although again breeding success was still below average at the Farne Islands, Saltburn, Bampton and Lowestoft. At Gateshead, productivity was at its highest level since 1995 (B. Little, pers. comm.).

In contrast to the low productivity recorded along much of the East Coast, black-legged kittiwakes once again fared better in **Orkney** where the overall mean was higher than that recorded in 2001. All individual colonies performed well, each fledging close to or above one chick per AON. Productivity was particularly high at Rora Head on Hoy, from where data was received for the first time, with an average of 1.46 chicks per nest fledging from 61 nests. On Rousay, breeding success was the highest recorded since 1996 (Meek 2002).

**Table 3.17.3** Black-legged kittiwake breeding success, 2001-2002, 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).

Region □	2001 chicks fledged/nest				2002 chicks fledged/nest				2001-2002 change	
	Nests <sup>n</sup>	Range	Mean	±s.e.	Nests <sup>n</sup>	Range	Mean	±s.e.	Mean <sup>n</sup>	±s.e.
SW Scotland <sup>a</sup>	191 <sup>1</sup>	-	0.27	-	190 <sup>1</sup>	-	0.44	-	+0.17 <sup>1</sup>	-
NW Scotland <sup>b</sup>	1,309 <sup>3</sup>	0.25-1.29	0.79	±0.30	1,289 <sup>3</sup>	0.21-1.28	0.70	±0.31	-0.08 <sup>3</sup>	±0.07
Shetland <sup>c</sup>	1,848 <sup>8</sup>	0.00-0.06	0.01	±0.01	1,278 <sup>8</sup>	0.00-0.49	0.20	±0.06	+0.19 <sup>8</sup>	±0.06*
Orkney <sup>d</sup>	1,014 <sup>7</sup>	0.01-1.15	0.74	±0.16	1,068 <sup>8</sup>	0.97-1.46	1.10	±0.05	+0.31 <sup>7</sup>	±0.15
N Scotland <sup>e</sup>	112 <sup>1</sup>	-	0.73	-	83 <sup>1</sup>	-	0.43	-	-0.30 <sup>1</sup>	-
NE Scotland <sup>f</sup>	647 <sup>3</sup>	0.46-0.90	0.64	±0.13	535 <sup>2</sup>	0.21-0.44	0.32	±0.12	-0.40 <sup>2</sup>	±0.06*
SE Scotland <sup>g</sup>	1,257 <sup>3</sup>	0.40-0.78	0.60	±0.11	1,268 <sup>3</sup>	0.33-0.96	0.59	±0.19	-0.01 <sup>3</sup>	±0.10
NE England <sup>h</sup>	1,316 <sup>5</sup>	0.71-1.30	0.97	±0.14	1,463 <sup>5</sup>	0.67-1.24	0.93	±0.12	-0.04 <sup>5</sup>	±0.11
E England <sup>i</sup>	157 <sup>1</sup>	-	0.93	-	155 <sup>1</sup>	-	0.95	-	+0.02 <sup>1</sup>	-
SW England <sup>j</sup>	86 <sup>2</sup>	0.58-0.65	0.62	±0.04	48 <sup>1</sup>	-	0.81	-	+0.16 <sup>1</sup>	-
NW England /I. of Man <sup>k</sup>	45 <sup>1</sup>	-	0.93	-	44 <sup>1</sup>	-	0.18	-	-0.75 <sup>1</sup>	-
Wales <sup>l</sup>	1,509 <sup>4</sup>	0.13-1.13	0.46	±0.23	1,424 <sup>4</sup>	0.00-1.12	0.53	±0.23	+0.06 <sup>4</sup>	±0.12
NE Ireland <sup>m</sup>	49 <sup>1</sup>	-	1.03	-	-	-	-	-	-	-
SE Ireland <sup>n</sup>	988 <sup>3</sup>	0.53-0.74	0.66	±0.06	867 <sup>2</sup>	0.67-1.29	0.98	±0.31	+0.26 <sup>2</sup>	±0.29
Total	10,528 <sup>43</sup>	0.00-1.30	0.58	±0.06	9,712 <sup>40</sup>	0.00-1.46	0.66	±0.07	+0.06 <sup>39</sup>	±0.05

Colonies: <sup>a</sup> Ailsa Craig; <sup>b</sup> Canna, Handa, St Kilda; <sup>c</sup> Noness, Hermaness, Westerwick, Foula, Noss, Ramna Geo, Sumburgh Head, Fair Isle; <sup>d</sup> Papa Westray, Rousay, Marwick Head, Row Head, Mull Head, Gultak, Costa Head, Hoy (2002 only); <sup>e</sup> North Sutor; <sup>f</sup> Bullers of Buchan, Sands of Forvie (2001 only), Fowlsheugh; <sup>g</sup> Isle of May, Dunbar, St Abb's Head; <sup>h</sup> Farne Islands, Coquet Island, Gateshead-Newcastle, Saltburn, Bampton; <sup>i</sup> Lowestoft; <sup>j</sup> Durlston Head-St Albans Head, Samson (2001 only); <sup>k</sup> Contrary Head-Traie Cronkan; <sup>l</sup> Bardsey, Elegug Stacks, Skomer, Great Orme; <sup>m</sup> Isle of Muck (2001 only); <sup>n</sup> Dunmore, Portlally (2001 only), Rockabill.

In colonies situated along the west of Scotland, breeding success appeared to be more variable, although the situation was similar to that found to the east with all colonies recording below average productivity. Inter-regional variation was particularly noticeable in **north-west Scotland**, with a low productivity of 0.21 chicks fledged per nest on St Kilda (the second lowest value recorded there since 1986) contrasting with a high value of 1.28 chicks fledged per nest on Handa.

Breeding success at colonies in south-west England and those bordering the Irish Sea was also variable, although overall productivity improved on 2001 figures in most regions. Breeding success was low on the Isle of Man (**north-west England**), Great Ormes Head and Elegug Stacks (both **Wales**) with no chicks fledging at the latter site for the first time since recording started in 1991. However, other sites in **Wales** performed better with an increase in productivity on 2001 recorded at Skomer and high productivity again recorded on Bardsey. In **south-east Ireland**, breeding success at Rockabill improved greatly on 2001, where a figure of 1.29 chicks fledged per nest was well above the colony average. Elsewhere in the region, productivity at Dunmore was similar to that recorded in 2001 and close to the long-term mean for the site.

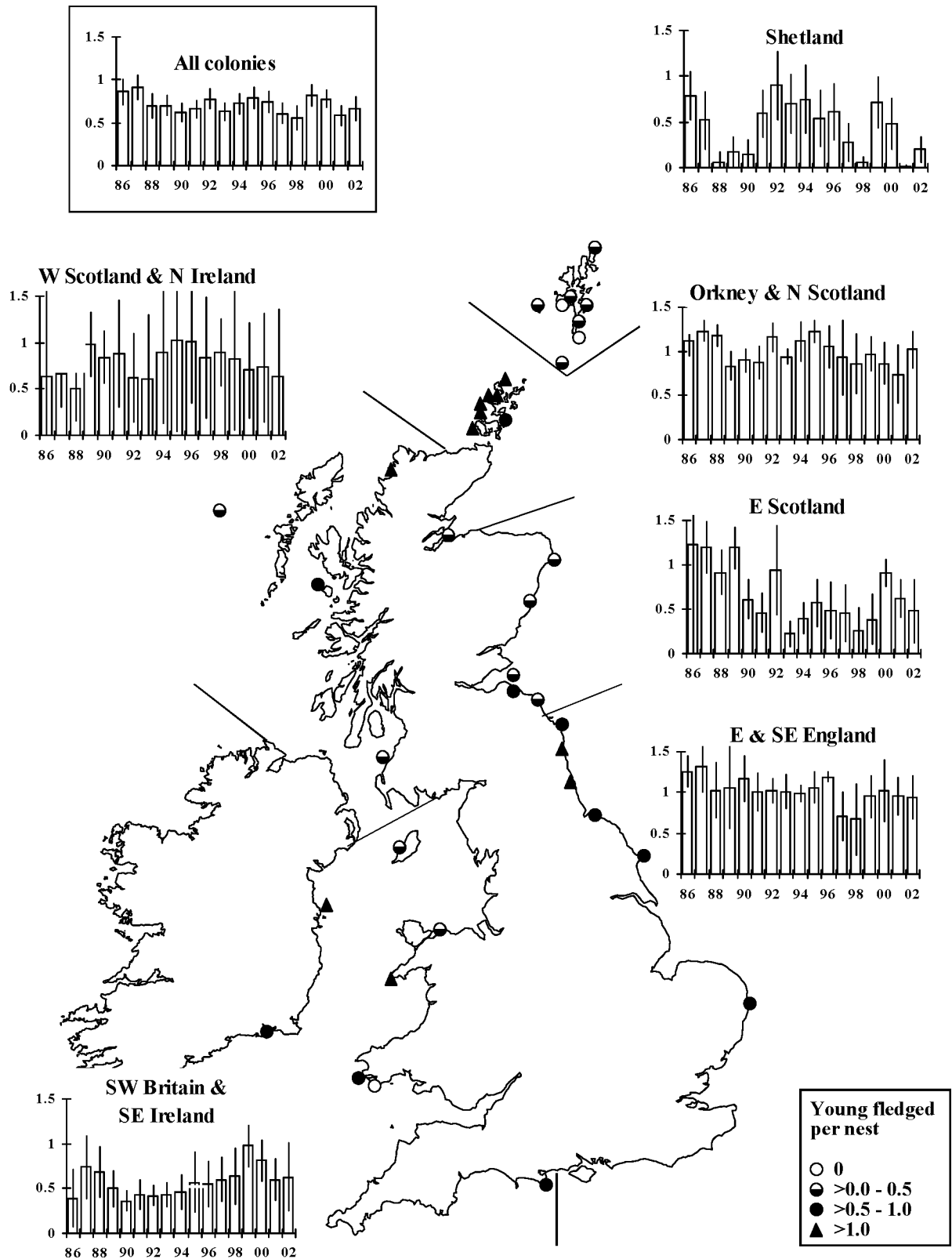
**Table 3.17.4** Breeding success of black-legged kittiwake (fledglings/AON) 2001-2002 and 1986-2001 at selected colonies mentioned in the text. Figures in parentheses under 2001 and 2002 are the number of nests from which the estimates of success were derived.

Region/site	2001	2002	1986-2001 mean ( $\pm$ s.e.)	No. of years
<b>SW Scotland</b>				
Ailsa Craig	0.27 (191)	0.44 (190)	0.49 (0.09)	15
<b>North-west Scotland</b>				
Handa	1.25 (725)	1.28 (696)	1.31 (0.06)	15
Canna	0.82 (358)	0.60 (358)	0.67 (0.06)	16
St Kilda	0.25 (236)	0.21 (235)	0.47 (0.06)	15
<b>Shetland</b>				
Noness	0.00 (75)	0.08 (53)	0.48 (0.19)	6
Hermaness	0.00 (127)	0.44 (147)	0.43 (0.10)	13
Westerwick	0.00 (49)	0.00 (33)	0.36 (0.11)	15
Foula	0.01 (145)	0.21 (131)	0.68 (0.10)	15
Noss	0.00 (326)	0.20 (186)	0.28 (0.06)	16
Ramna Geo	0.03 (148)	0.18 (110)	0.56 (0.13)	9
Sumburgh Head	0.00 (283)	0.00 (177)	0.54 (0.12)	16
Fair Isle	0.06 (695)	0.48 (441)	0.77 (0.12)	16
<b>Orkney</b>				
Mull Head	1.15 (101)	1.11 (116)	1.11 (0.04)	16
Papa Westray	0.01 (148)	1.03 (125)	0.83 (0.10)	13
Rousay	0.50 (180)	1.09 (162)	0.85 (0.10)	13
Costa Head	1.08 (211)	1.07 (199)	1.14 (0.06)	9
Gultak	0.47 (30)	0.97 (32)	0.88 (0.06)	16
Marwick Head	1.02 (162)	1.02 (170)	1.11 (0.04)	16
Row Head	0.97 (182)	1.04 (203)	1.08 (0.05)	16
<b>North Scotland</b>				
North Sutor	0.73 (112)	0.43 (83)	0.74 (0.07)	12
<b>NE Scotland</b>				
Bullers of Buchan	0.90 (194)	0.44 (172)	0.56 (0.11)	12
Sands of Forvie	0.46 (112)	-	0.39 (0.10)	12
Fowlsheugh	0.56 (341)	0.21 (295)	0.71 (0.10)	14
<b>SE Scotland</b>				
Isle of May	0.61 (459)	0.47 (477)	0.56 (0.10)	16
Dunbar	0.78 (527)	0.96 (537)	0.94 (0.09)	15
St Abb's Head	0.40 (271)	0.33 (254)	0.71 (0.08)	15
<b>NE England</b>				
Coquet Island	1.30 (66)	1.20 (81)	1.03 (0.08)	9
Bempton	1.10 (161)	0.76 (277)	1.06 (0.08)	15
Farnes	0.71 (724)	0.79 (644)	0.93 (0.07)	15
Gateshead	0.92 (195)	1.24 (213)	1.11 (0.05)	13
Saltburn	0.79 (170)	0.67 (243)	0.87 (0.07)	16
<b>East England</b>				
Lowestoft	0.93 (157)	0.95 (155)	1.08 (0.07)	16
<b>SW England</b>				
Durlston Hd – St Albans Hd	0.65 (55)	0.81 (48)	0.68 (0.11)	11
Isles of Scilly	0.58 (31)	-	0.48 (0.15)	8

**Table 3.17.4** (continued)

<b>Region/site</b>	<b>2001</b>	<b>2002</b>	<b>1986-2001 mean (<math>\pm</math>s.e.)</b>	<b>No. of years</b>
<b>Wales</b>				
Bardsey	1.13 (288)	1.12 (292)	0.69 (0.12)	14
Elegug Stacks	0.13 (111)	0.00 (87)	0.35 (0.07)	11
Skomer	0.21 (825)	0.61 (797)	0.69 (0.06)	16
Great Ormes Head	0.38 (285)	0.38 (248)	0.56 (0.07)	13
<b>NW England</b>				
Isle of Man	0.93 (45)	0.18 (44)	0.48 (0.17)	5
<b>NE Ireland</b>				
Muck	1.03 (49)	-	First data in 2001	
<b>SE Ireland</b>				
Rockabill	0.74 (131)	1.29 (58)	0.97 (0.15)	6
Dunmore	0.70 (8380)	0.67 (809)	0.67 (0.05)	16
Portally	0.53 (19)	-	0.39 (0.12)	14





**Figure 3.17.2** Breeding productivity (chicks fledged per well-built nest) at black-legged kittiwake colonies during 1986-2002, showing regional and annual variation. Symbols on map represent 2002 data for individual colonies; histograms show annual averages (with 95% confidence limits) for the regions indicated.

### 3.18 Sandwich Tern *Sterna sandvicensis*

*Numbers in north-east Scotland, east England, south-east England and Wales were much higher than recent years. No birds bred in south-east Scotland. However, desertions and possible movement between colonies in south-east England and also between Wales and north-west England made comparisons with 2001 difficult – some of the birds may have been double-counted. The overall productivity of 0.69 fledged per pair was lower than 2000 and 2001 levels and slightly below the long-term average. However, this figure should be considered a minimum, due to the possible double-counting of birds. Colonies in north-east Scotland, east England and Wales continued to be productive.*

#### *Breeding numbers (Tables 3.18.1 and 3.18.2)*

In **south-west Scotland** early flooding prevented a breeding count at Loch Ryan, but fewer than 80 pairs of terns of all species were present. Continuous erosion of the shingle peninsular has resulted in fewer birds breeding at the site in more recent years (P Collins pers. comm.).

In **Orkney**, 75 pairs were recorded at Tuquoy, Westray (Meek 2002). There were no other reports from the Northern Isles. In 2001, 13 pairs bred at two other colonies.

In **north-east Scotland**, numbers increased by 21% at the Sands of Forvie to 975 pairs. This was the highest count for the site and the region since 1991, and may have been connected to events in **south-east Scotland**, where no birds were recorded breeding in 2002 (1986–2001 mean = 254, s.d.= 207). On the Isle of May, where numbers had rapidly built up since 1998, up to 50 birds were recorded at the beginning of May but these moved on before breeding.

**Table 3.18.1** Regional population changes (breeding pairs).at monitored Sandwich tern colonies, 2001–2002 and 1986–2001. Trends for 1986–2001 are average percentage 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. 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	2001	2002	2001-2002 % change	1986-2001 % annual change
SW Scotland	N/A	+	-	-
NE Scotland	804	975	+21.3 <sup>1</sup>	-5.5*
SE Scotland	c.500	0	-100.0 <sup>2</sup>	-19.1 n.s.
NE England	3,554	3,584	-0.8 <sup>3</sup>	-1.9 **
E England	4,472	4,602	+2.9 <sup>4</sup>	+0.6 n.s.
SE England	295	≤597	+102.4 <sup>5</sup>	-4.0 ***
SW England	0	75	- <sup>1</sup>	-27.1 n.s.
NW England	380	360	-5.6 <sup>1</sup>	-6.1 **
Wales	349	782	+124.1 <sup>1</sup>	-3.05 *
NE Ireland	1,369	1,290	-5.8 <sup>2</sup>	+1.1 n.s.
NW Ireland	38	21	-44.7 <sup>1</sup>	+0.2 n.s.
SE Ireland	1,068	825	-22.8 <sup>1</sup>	+3.2 n.s.
Britain and Ireland	12,829	≤13,111	+2.2 <sup>22</sup>	-0.7 n.s.

Numbers were similar to 2001 in **north-east England**, but slightly below the 11-year mean for the region (3,786, s.d.= 416). Numbers on the Farnes fell 20% to the lowest level for four years, but there was a corresponding 42% increase on Coquet, to 1,689 pairs.

The population in **east England** was the second highest since 1986 (1986–2001 mean = 3,927, s.d. = 501.4). At Blakeney numbers trebled between 2001 and 2002, to 750 pairs. Nearby Holkham, a new colony in 2001, also saw a large increase, to 800 pairs. Elsewhere in north Norfolk, the region's largest colony at Scolt Head declined by 24% to 3,050 pairs, although it remained well above its 16-year mean (1,590, s.d.= 1389).

The apparent increase in numbers in **south-east England** should be treated with caution. The first-recorded breeding at Pitts Deep to Hurst, Hants since 1996 may have included re-lays from North Solent NR, where birds had deserted by mid-season. In addition, an incomplete count of Burntwick Island (65 birds) meant that no comparison could be made with 2001 (*c.*240 pairs) for this site. Elsewhere, 33 pairs bred at Chichester Harbour (breeding last recorded there in 1994), possibly the result of a storm-induced reduction in suitable breeding area at nearby Langstone. There was also an approximate seven-fold increase in numbers at Rye Harbour to 125–200 pairs.

**Table 3.18.2** Numbers of Sandwich tern breeding pairs at regularly counted colonies in Britain and Ireland, 1991–2002. (- indicates that no data were available, + indicates birds were present but no quantitative data available). \*Please note that British and Irish totals are for the sample of monitored colonies in that year only and not the entire population.

Colony	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Loch Ryan	14	13	35	60	80	19	0	120	70	70	-	+
Loch of Strathbeg	283	304	515	923	481	375	355	523	473	0	0	0
Sands of Forvie	1115	29	0	0	20	0	4	22	247	524	804	975
Isle of May	-	0	0	0	0	0	0	2	110	<i>c</i> 300	<i>c</i> 500	0
Long Craig	1	40	200	31	4	2	0	0	16	0	0	0
Inchmickery	473	112	9	98	1	0	0	0	0	0	0	0
Coquet Island	1736	2131	1469	1611	1543	1511	1659	1897	1676	1726	<i>c</i> 1190	1689
Farne Islands	2126	2730	2349	<i>c</i> 1750	1837	2179	2484	1785	1946	1950	2364	1881
Scolt Head	320	280	853	2406	1588	450	220	650	1000	4200	4000	3050
Holkham NNR	0	0	0	0	0	0	0	0	0	0	221	800
Blakeney Point	3000	4000	3000	1000	1450	3500	3000	3000	3200	<i>c</i> 100	250	750
Minsmere	20	0	0	0	23	0	0	0	0	0	0	0
Havergate	84	70	125	300	250	104	0	0	0	6	1	2
Foulness/Maplin	280	548	275	405	330	53	36	0	0	0	-	0
Burntwick Island	-	-	-	-	-	-	-	15	155	333	<i>c</i> 240	+
Dungeness	250	250	40	0	0	120	110	0	0	0	0	0
Rye Harbour	2	0	90	<i>c</i> 125	<i>c</i> 100	12	<i>c</i> 30	13	26	0	24	<i>c</i> 162
Pagham Harbour	2	0	0	0	0	0	0	0	0	0	0	0
Chichester Harbour	5	27	45	9	0	0	0	0	0	0	0	33
Langstone Harbour	0	0	0	0	0	12	91	158	59	88	61	29
North West Solent	151	150	85	148	233	173	155	92	275	268	210	226
Pitts Deep - Hurst	0	90	103	150	2	25	0	-	0	0	0	147
Brownsea Island	75	82	120	70	107	140	165	<i>c</i> 155	174	0	0	75
Anglesey	601	500	564	400	650	650	450	460	604	450	349	782
South Walney	0	450	0	0	0	0	0	0	0	0	0	0
Foulney	332	0	253	380	343	0	0	0	0	0	0	0
Hodbarrow	520	360	100	0	59	360	230	320	380	340	380	360
Larne Lough	135	132	<i>c</i> 64	152	234	255	253	178	450	348	531	373
Green Is., Carlingford	172	108	<i>c</i> 721	449	270	502	935	<i>c</i> 1200	582	650	838	917
Strangford Lough	879	657	587	346	532	711	789	389	782	893	-	-
Lady's Island Lake	1469	1129	1254	1447	1130	1358	1050	1015	1048	1005	1068	825
Lough Swilly	99	116	119	220	222	240	149	176	259	286	258	-
Mulroy Bay	76	107	117	23	0	0	0	0	0	0	0	-
Lower Lough Erne	42	42	51	40	61	56	39	16	21	51	38	21
Total*	14262	14457	13143	12543	11550	12807	12203	12186	13553	13588	13327	13097

Birds returned to Brownsea, **south-west England** for the first time in three years. The 75 pairs was, however, below the 1986–1999 mean for the colony (103, s.d.= 42).

Numbers in **Wales** increased by 124% to 782 pairs, the highest level since 1988. It is possible that birds deserting from Hodbarrow re-laid at the Anglesey colony, although no count dates were given to support this.

Although the number at Hodbarrow, **north-west England**, fell slightly, to 360 pairs, they remained well above the 1986–2001 mean for the site (201, s.d.= 177).

The population at Carlingford and Larne Loughs **north-east Ireland** remained above average although it was below 2001 levels due to numbers at Larne Lough falling 30% from the 2001 high. A 9% increase at Carlingford Lough to 917 pairs partially compensated for this. Data were only received from one small colony in **north-west Ireland**: numbers fell 45% at Lower Lough Erne to 21 pairs (1986–2001 mean = 51, s.d.= 20). In **south-east Ireland**, numbers at Lady's Island Lake Co. Wexford fell to 825 pairs, their lowest level since 1988.

*Breeding success* (Tables 3.18.3 and 3.18.4)

In 2002, the overall productivity at 16 colonies in Britain and Ireland was lower than 2000 and 2001 levels, averaging 0.69 chicks per pair. This was marginally below the 1986–2001 mean of 0.71 (s.e. = 0.04). However, the 2002 figure should be considered a minimum due to probable inter-colony movements during the season.

The colony at Loch Ryan, **south-west Scotland**, failed completely due to flooding. This site was not monitored in 2001, but is regularly flooded due to erosion of the shingle peninsular.

No productivity figures were available for **Orkney**, but 28 chicks were ringed from 75 pairs at Tuquoy, Westray (Meek 2002).

Despite being lower than 2000 and 2001, productivity at the Sands of Forvie, **north-east Scotland**, was high - 975 pairs fledged about 0.95 chicks per pair, well above the long-term mean for the colony.

Breeding success in **north-east England** was well below the long-term mean for the region (0.61, s.e.= 0.08), with 1,703 pairs fledging just 0.29 per pair. It was the least productive season since 1998 on Coquet, and all 14 nests on Lindisfarne were lost to oystercatcher predation. Productivity was not monitored on the Farnes – however, there were reports of high numbers of fledged young (Walton 2002).

Although productivity fell below 2001 levels in **east England**, it remained moderate to high at all colonies. The overall fledging rate of 0.88 chicks per pair was above the 1986–2001 mean (0.75, s.e.= 0.07).

Most colonies in **south-east England** were unproductive, although overall success was higher than in 2001 due to a good season at Rye Harbour (c.162 pairs fledged c.0.93/pair). All 226 pairs deserted North Solent NR at the end of June for unknown reasons and 147 pairs at Pitts Deep to Hurst did poorly. However, if the region's breeding total was inflated due to double-counting, as may have been the case, then breeding success would be higher than shown in table 3.18.4.

In **south-west England**, 75 pairs on Brownsea suffered heavy predation, resulting in a below-average productivity of 0.33 per pair for the site.

Productivity of 782 pairs on Anglesey, **Wales**, was 0.79 chicks per pair, slightly below the long-term average.

In **north-west England**, Hodbarrow had the lowest fledging rate for seven years, with birds deserting during the season; only six chicks fledged from 360 pairs. Some of these birds, however, may have re-laid on Anglesey and been successful second time around.

At Lower Lough Erne, **north-west Ireland**, a minimum of ten chicks fledged from 21 pairs. Productivity was lower than 2000 and 2001 levels, but above average for the site. In **south-east Ireland**, 232 pulli were ringed from 825 pairs at Lady's Island Lake, indicating it had been a relatively poor season (Daly *et al.* 2002).

**Table 3.18.3.** Productivity of Sandwich terns expressed as chicks per pair 2001–2002 and 1986–2001 at selected sites referred to in the text. (- indicates no data available)

Region/site	2001	2002	1986–2001	
			mean ( $\pm$ s.e.)	No. of years
<b>SW Scotland</b>				
Loch Ryan	-	0.00	-	-
<b>N Scotland</b>				
Sands of Forvie	1.25	0.95	0.58 (0.14)	12
<b>NE England</b>				
Coquet	-	0.30	0.71 (0.06)	10
Lindisfarne	-	0.00	N/A	
<b>SE England</b>				
Rye Harbour	0.13	c.0.93	0.33 (0.15)	11
North Solent NR	<1.11	0.00	1.35 (0.38)	4
Pitts Deep - Hurst	N/A	0.11	-	-
<b>SW England</b>				
Brownsea	N/A	0.33	0.68 (0.11)	11
<b>Wales</b>				
Anglesey	0.97	0.79	0.82 (0.09)	11
<b>NW England</b>				
Hodbarrow	>0.53	0.02	0.44 (0.15)	12
<b>NW Ireland</b>				
Lower Lough Erne	>0.55	>0.48	0.35 (0.09)	6
SE Ireland				
Lady's Island Lake	<0.89	<0.28	0.68 (0.13)	4

**Table 3.18.4** Sandwich tern productivity, 2001–2002, 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	2001 chicks fledged/pair			2002 chicks fledged/pair		
	Pairs <sup>n</sup>	Range	Overall	Pairs <sup>n</sup>	Range	Overall
SW Scotland	-		-	-		0.00
NE Scotland	804 <sup>1</sup>		c.1.25	975 <sup>1</sup>		c.0.95
SE Scotland	c.500 <sup>1</sup>		>0.50	0		-
NE England	-		-	1,703 <sup>2</sup>	0.00–0.30	0.29
E England	4,472 <sup>4</sup>	1.00–2.00	1.00	4,602 <sup>4</sup>	0.73–1.00	0.88
SE England	85 <sup>2</sup>	0.13–0.16	0.15	597 <sup>5</sup>	0.00–0.93	≥0.29
SW England	0 <sup>1</sup>		0.00	75 <sup>1</sup>		0.33
Wales	349 <sup>1</sup>		0.97	782 <sup>1</sup>		0.79
NW England	380 <sup>1</sup>		>0.53	360 <sup>1</sup>		0.02
NW Ireland	38 <sup>1</sup>		>0.55	21 <sup>1</sup>		>0.48
Total	6,628 <sup>12</sup>	0.13–2.00	0.95	9,115 <sup>16</sup>	0.00–1.00	≥0.69

### 3.19 Roseate Tern *Sterna dougallii*

*Numbers of roseate terns recovered from 2001 levels, with 756 pairs recorded from nine sites in 2002. Some birds possibly moved from the largest colony on Rockabill in south-east Ireland to other colonies in Britain and Ireland. The Coquet and Lady's Island Lake colonies showed the largest increase, whereas Scottish colonies reached an all-time low. Productivity was slightly below that of recent years, but was still high, with 1.32 fledged per pair overall. Once again, birds at the largest colony - Rockabill - had the highest breeding success, but most other colonies fledged at least one chick per pair.*

#### *Breeding numbers (Table 3.19.1)*

There were signs that the 2001 drop in the breeding population was only temporary, with numbers in Britain and Ireland in 2002 returning to 2000 levels. The total population increased by 6.6%, to 756 pairs in 2002, the second highest in over 25 years. The increase was attributed to events at Coquet, Northumberland and at Lady's Island Lake, Co. Wexford.

In all, 74 pairs bred within seven sites in the UK, the highest number since 1990. Numbers remained low in **east Scotland**, where breeding was recorded from only one site. Although two nests were located, it is thought there was only one breeding pair with a single female. This would make numbers in the region in 2002 the lowest on record. However, sightings of additional birds in the Firth of Forth suggest more birds were present (Jones 2003).

Numbers continued to increase in **north-east England**, with breeding confirmed at three sites, including one new site. Numbers increased for the second successive year on Coquet, up 36% to 57 pairs, the highest since 1975. The colony on the Farnes continued to keep a foothold; a new nesting terrace there should encourage more birds to breed in the future.

**Table 3.19.1** Roseate tern numbers (breeding pairs) at most colonies in Britain and Ireland 1991–2002. (- indicates that no data were available)

Region: Colony	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2001-2002 % change
<b>E Scotland:</b>													
Inchmickery	0	0	0	2	0	0	0	0	0	0	0	0	
Forth B	23	17	17	7	11	7	8	8	9	10-11	1	2	+100.0
Forth C	-	-	-	-	1	1	0	0	0	1	1	0	-100.0
New colony	0	0	0	0	0	0	0	0	0	1	0	0	
<b>NE England:</b>													
Farne Islands	3	4	3	2-3	2	2	3	3	4	1	1	1	0.00
Coquet Island	20	29	c30	c38	38	24	25	29	34	34	42	57	+35.7
New colony A	0	0	0	0	1	14	2	3	0	0	0	0	
New colony B	0	0	0	0	0	0	0	0	0	0	0	1	-
<b>Wales:</b>													
Anglesey A	1	0	16	18	10	1	2	3	3	2	7	7	0.00
Anglesey B	0	0	0	0	0	0	1	0	0	0	0	0	
Anglesey C	4	7	5	2	0	0	0	2-3	0	0	0	0	
<b>NE Ireland:</b>													
Larne Lough	4	3	0	4	7	13	7	3	10	4	6	4	-33.3
Carlingford L.	0	0	0	0	0	0	2	0	0	0	0	0	
<b>SE Ireland:</b>													
Rockabill	366	378	427	394	554	557	602	578	611	618	605	588	-2.8
Lady's Island	56	76	76	140	60	120	48	80	116	>78	46	96	+108.7
<b>Total*</b>	450	520	578	614	686	744	703	712	788	>750	709	756	+6.6

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

In **Wales**, seven pairs again bred on Anglesey, but only four pairs were recorded in **north-east Ireland**, two fewer than in 2001. The only other region where breeding was reported was **south-east England**, the first for four years: one site held two pairs.

Numbers fell almost 3% at the largest colony on Rockabill, **south-east Ireland**, the gradual decline here probably due to birds moving to other colonies in Britain and Ireland. Ringing revealed 92% of ringed birds were recruited from Rockabill, 3 and 4-year-olds forming the largest components (22% and 16%, respectively) (Patrick *et al.* 2002). Elsewhere, the number at Lady's Island Lake recovered, to a level similar to the 1994-99 mean (94, s.d.= 37).

*Breeding success* (Table 3.19.2)

Productivity was high at most colonies in 2002. The overall breeding success for Britain and Ireland was slightly higher than the 10-year mean (1.29, s.e.= 0.07), with 1.32 chicks fledged per pair.

In **Scotland**, at Forth B two chicks (presumably near-fledged) were ringed towards the end of August.

The colony on Coquet, **north-east England**, was successful for the second successive year, productivity remaining above the 12-year mean (1.00, s.e.= 0.06). The single pair on the Farnes fledged two chicks and the pair breeding at the third site in the region was also successful, fledging one or two chicks.

**Table 3.19.2** Breeding success of roseate terns in Britain and Ireland 2001–2002.

Region/Site	Pairs	2001 fledged/pair	Pairs	2002 fledged/pair
<b>E Scotland</b>				
Forth B	1	1.00	2	≤1.00
Forth C	1	0.00	-	-
<b>NE England</b>				
Farnes	1	1.00	1	2.00
Coquet	42	1.29	57	1.25
New colony B	-	-	1	1.00-2.00
<b>SE England</b>				
Colony A	-	-	2	0.00
<b>Wales</b>				
Anglesey A	7	0.57	7	1.00
<b>NE Ireland</b>				
Larne Lough	6	0.83	4	≤0.75
<b>SE Ireland</b>				
Rockabill	605	1.50	588	1.39
Lady's Island Lake	46	0.00	96	c.1.00
<b>Total</b>	<b>709</b>	<b>1.37</b>	<b>758</b>	<b>1.32</b>

The two pairs in **south-east England** failed to raise any young, but birds in **Wales** had their most productive season since 1997: seven pairs fledged seven young – a higher than average productivity for the region (1989–2001 mean = 0.78, s.e.= 0.17).

In **north-east Ireland**, three near-fledged chicks were ringed at Larne Lough – a maximum productivity of 0.75 per pair.

Although poor weather at the beginning of the season delayed nesting on Rockabill, **south-east Ireland**, breeding success was high. Overall, 1.39 chicks fledged per nest (n=100), slightly lower

than the previous three years. Relatively short lay- and hatch intervals and high chick growth rates and fledging weights indicated good food availability. Almost exclusively, sandeels (*Ammodytes* sp.) and clupeids were the main prey items (Patrick *et al.* 2002). Extensive pre-season rat baiting meant the predation problems of 2001 were not repeated at Lady's Island Lake in 2002: 101 chicks were ringed and productivity was estimated as about one chick per nest. The mean clutch size of nests built under some sort of cover was higher than for exposed nests (1.70 and 1.35, respectively) (Daly *et al.* 2002).

### 3.20 Common Tern *Sterna hirundo*

*With the exception of south-east Scotland – where birds failed to return to the Isle of May – numbers of common terns in Scotland recovered from 2001 declines. Most regions in the rest of Britain and Ireland were stable or continued to increase, with the largest increases reported from south-east Ireland. Productivity at monitored colonies was below 2001 levels in most regions in 2002. Bad weather was the most-frequently cited cause, but colonies in Scotland also suffered from an apparent lack of available food, disturbance and predation.*

#### *Breeding numbers* (Tables 3.20.1 and 3.20.2)

Numbers increased in **west Scotland** by more than 40%, recovering from 2001 declines. A total of 1,217 pairs bred at 25 colonies monitored as part of the Mink-Seabird Project in 2002. This compared to a minimum of 886 pairs at 20 colonies in 2001 and 1,269 pairs at 19 sites in 2000. Again the largest colony was on Sgeir na Caillich, Loch Melfort, considered mink-free at the beginning of the season. Following heavy otter *Lutra lutra* predation and the early desertion of the site in 2001, the traditionally largest colony - in the Sound of Mull - supported fewer birds than average in 2002 (Craik 2002). Elsewhere in south-west Scotland, 85 pairs were reported from three other sites, compared to 18 pairs in 2001. Thirteen pairs bred at two further sites in north-west Scotland, compared to 32 pairs in 2001. In addition, 414 pairs were counted in a complete census of south Harris to north South Uist for the first of a five-year project looking at the effects of mink eradication on tern and gull populations in the Outer Hebrides (Evans & Allan 2003).

Ten pairs were recorded from five sites in **Shetland**, compared to 14 pairs at the same sites in 2001. Numbers in **north Scotland** returned to 2000 levels, increasing by 11% to 568 pairs. The most notable increases occurred at Alness Point (where the population fell over 95% between 2000 and 2001) and at Barmac's. However, the population at Nigg fell 52% to a below-average 139 pairs.

Overall numbers in **north-east Scotland** also reversed the decline of the previous two years, although there was variation between colonies. The largest increase occurred at 'Site X', a relatively recent rooftop site. In contrast, the Loch of Strathbeg colony continued to decrease, down 61% to 22 pairs, well below average. There was also an 80% decline at Kirkhill.

Only four occupied colonies were counted in **south-east Scotland** in 2002. Overall numbers fell, due to a 98% decline on the Isle of May, to the lowest level since 1980. Although the large colony at Leith Docks was not counted in 2002, there was thought to be 500–600 pairs, similar to 2001.



**Table 3.20.1** Regional population changes at monitored common tern colonies, 2001–2002 (breeding pairs). Superscript = number of colonies counted in both years. Regional samples <100 pairs not included.

Region	2001	2002	2001-2002
SW & NW Scotland	920	1,315	+42.9 <sup>34</sup>
N Scotland	<511	<568	+11.2 <sup>8</sup>
NE Scotland	333	389	+16.8 <sup>7</sup>
SE Scotland	239	169	-29.3 <sup>4</sup>
NE England	1,606	1,741	+8.4 <sup>9</sup>
E England	1,082	1,128	+4.8 <sup>16</sup>
SE England	592	601	+1.5 <sup>8</sup>
SW England	276	235	-14.9 <sup>3</sup>
Wales	838	844	+0.7 <sup>5</sup>
NW England	230	196	-14.8 <sup>4</sup>
NE Ireland	1,015	1,016	+0.1 <sup>3</sup>
SE Ireland	1,238	1,477	+19.3 <sup>3</sup>
Britain and Ireland	8,880	9,679	+9.0 <sup>104</sup>

In **north-east England**, total numbers increased by over 8% for the second successive year. Numbers on Coquet increased by 11% to 1,083 pairs, the highest for twenty years, but the colony on the Farnes declined further and reached its lowest level since 1976. The other large colony in the region, at Teesmouth, continued to increase in size, up 7% to a record 420 pairs.

Comparable data were only received from one colony in **central England** in 2002: numbers remained stable at Rye Meads, Herts. The region holds nearly 8% of the British total (N. Ratcliffe *in litt.*) so it is hoped more counts will be forthcoming in future years.

**East England's** population increased slightly at monitored colonies, largely due to a doubling of numbers at Blackwater Estuary, Essex to over 110 pairs. There were no significant changes at other colonies in the region.

Overall numbers at eight colonies in **south-east England** remained stable in 2002 although there was some variation at individual colonies. No birds bred at the usually occupied North Solent NNR. Instead, these may have made up the additional 78% of numbers that bred farther along the coast at Pitts Deep to Hurst. Langstone Harbour experienced a 40% reduction in breeding birds, following four years with relatively high numbers. Nearby Chichester Harbour was the probable recipient, recording 40 pairs; birds have bred here only intermittently since 1993. The relatively large colonies in the Medway Estuary, Kent were not counted in 2002.

Numbers fell at all three **south-west England** sites monitored in both 2001 and 2002. However, populations at the two largest colonies – Brownsea and Lodmoor – remained above their long-term mean. On the Scillies, comparable data were only available for Samson, although a count of 145 individuals was also made on Green Island and Annet.

The two largest colonies in **Wales** – Shotton and Ynys Feurig – increased further in size in 2002, whilst the smaller two – Cemlyn and Inland Sea – continued to decline. However, the increases occurring in the region as a whole over the last 10 years appeared to have tailed off in 2002, with overall numbers remaining stable (1992–2001 mean = 579, s.d. = 130).

**Table 3.20.2** Population changes of common terns 2001–2002 and 1986–2001 at selected sites referred to in the text. (P = pairs; I = individuals).

Region/Site		2001	2002	% Change 2001–2002	1986–2001 Mean (±s.d.)	No. years
<b>SW Scotland</b>						
Sgeir na Caillich	P	442	421	-4.8	187 (106)	12
G.Eileanan, Sd Mull	P	0	229	-	569 (195)	16
<b>N Scotland</b>						
Alness Point	P	10	110	+1000.0	122 (74.1)	14
Barmac's	P	125	210	+68.0	147 (153)	13
Nigg	P	295	139	-52.9	173 (114)	13
<b>NE Scotland</b>						
'Site X'	P	c.45	c.134	+197.8	31 (30.0)	5
Loch of Strathbeg	P	57	22	-61.4	97 (32.1)	15
Kirkhill	P	55	10–12	-80.0	26 (21.8)	6
<b>SE Scotland</b>						
Isle of May	P	132	2	-98.5	170 (110)	16
Leith Docks	P	507	+	-	449 (158)	14
<b>NE England</b>						
Coquet	P	977	1,083	+10.8	750 (166)	16
Farnes	P	114	91	-20.2	236 (74.4)	16
Teessmouth	P	394	420	+6.6	195 (138)	6
<b>C England</b>						
Rye Meads	P	45	47	+4.4	41 (3.6)	11
<b>E England</b>						
Blackwater	P	54	>110	+103.7	38 (20.6)	6
<b>SE England</b>						
North Solent NNR	P	137	0	-100.0	181 (94.4)	16
Pitts Deep - Hurst	P	211	c.375	+77.7	126 (77.5)	15
Langstone Harbour	P	148	88	-40.5	66 (46.0)	16
Chichester Harbour	P	0	40	-	19.7 (27.2)	16
<b>SW England</b>						
Brownsea	P	203	179	-11.8	145 (35.2)	16
Lodmoor	P	c.43	36	-16.3	26 (17.0)	4
Samson, Scillies	P	c.30	c.20	-33.3	-	-
<b>Wales</b>						
Shotton Pools	P	545	555	+1.8	302 (122)	16
Ynys Feurig	P	c.120	c.150	+25.0	74 (24.8)	16
Cemlyn	P	57	46	-19.3	66 (27.7)	14
Inland Sea	P	26	1	-96.2	17 (10.7)	12
<b>NW England</b>						
Seaforth	P	172	143	-16.7	61 (63.6)	16
<b>NE Ireland</b>						
Larne Lough	P	542	482	-11.1	296 (157)	14
Carlingford Lough	P	448	459	+2.5	351 (30.7)	13
<b>SE Ireland</b>						
Rockabill	P	693	774	+11.7	319 (209)	16
Lady's Island Lake	P	c.322	c.461	+43.2	295 (89.4)	13
Dublin Port	P	223	242	+8.5	114 (79.4)	7

The apparent decline observed in **north-west England** was largely due to fewer birds breeding at Seaforth in 2002, although the colony remained above its 16-year mean. However, only six artificial breeding rafts were launched there in 2002, compared to eight in 2001.

The total number at three colonies in **north-east Ireland** remained remarkably stable in 2002. The populations in Larne and Carlingford Loughs remained well above average, but on the whole were at a

lower level than two to three years ago. No data were available for the largest colony in the region at Strangford Lough.

Rockabill, Lady's Island Lake and Dublin Port, **south-east Ireland**, reported increases in 2002, the colonies on Rockabill and at Dublin Port reaching their highest ever number. The above-average count for Lady's Island Lake was an estimate based on a common to Arctic tern ratio of 5:2 for a 'commic' count of 649 pairs.

#### *Breeding success* (Tables 3.20.3 and 3.20.4)

Overall productivity was below 2001 levels in most regions in 2002. Colonies in Scotland again were least successful, fledging a below-average minimum of 0.36 chicks per pair (1989–2001 mean = 0.48, s.e. = 0.05). Productivity of English colonies, although above the long-term mean, was moderate (1989–2001 mean = 0.81, s.e. = 0.08), whilst productivity in Wales and south-east Ireland remained high, with 1.20 chicks per pair (1990–2001 mean = 1.18, s.e. = 0.13) and 1.32 chicks per pair (1991–2001 mean = 1.50, s.e. = 0.15) respectively.

In the Mink-Seabird Project in **west Scotland**, productivity was below 2000 and 2001 levels, with around 656 young fledged from 1,217 pairs. Sites where birds bred successfully had had all mink removed or were naturally free of mink. Seven pairs at Loch Feochan had the highest productivity, with 2.29 chicks per pair. However, otter predation again made it difficult to assess the benefit of mink control. One otter in particular had a huge impact on Glas Eileanan, Sound of Mull, causing the failure of all 229 pairs (Craik 2002). The largest colony, in Loch Melfort, again incurred predation by peregrine *Falco peregrinus* on large chicks late in the season.

Only one chick fledged from eight colonies monitored in **north Scotland**. The main reason cited for the failure was a lack of food, but inclement weather early in the season, disturbance by people and otter predation also contributed to the worst season on record (1989–2001 mean = 0.49, s.e. = 0.09) (Butterfield 2002).

The low fledging rate of 0.30 chicks per pair in **north-east Scotland** was about average for the region (1986–2001 mean = 0.33, s.e. = 0.07). The highest productivity was at a sub-colony of the rooftop 'Site X' (34 pairs), but the largest colony, at St Fergus (147 pairs), incurred heavy predation by carrion crows *Corvus corone*.

Overall productivity in **south-east Scotland** was higher than in 2001, but remained well below the 1986–2001 mean (0.62, s.e. = 0.10). However, breeding success was probably higher than indicated by these figures as many fledged young went unrecorded at the largest colony at Grangemouth (106 pairs).

A third consecutive productive year for common terns in **north-east England** was again biased by the success of the largest colony, on Coquet. A productivity of 1.97 per pair (n=32) was the second highest on record for the colony. Birds on the nearby Farnes, however, had an even less productive season than in 2001 (n=30). In addition, 235 pulli were ringed at the Teesmouth colony (420 pairs), similar to 2001 (394 pairs; 213 pulli).

Only one colony in **central England** yielded information on breeding success in 2002; birds had a fairly good season at Rye Meads, Herts.

Productivity in **east England** was the lowest for four years. The smallest monitored colony, at Hoveton Great Broad (23 pairs), had the highest productivity in the region and was the only site to record an increase in productivity compared with 2001. The north Norfolk colonies at Snettisham (85 pairs), Holkham (110 pairs) and Blakeney (165 pairs) were especially unsuccessful, the latter due to gull predation.

**South-east England** colonies experienced their lowest overall productivity since 1990. The largest colony at Pitts Deep to Hurst (350–400 pairs) fledged a minimum 15 young. Flooding and severe weather may have been to blame for low fledging rates at Langstone Harbour (88 pairs) and Hayling Island (7 pairs).

The largest colony in **south-west England**, on Brownsea (179 pairs), suffered its lowest productivity on record due to predation/flooding. The Lodmoor colony (36 pairs) also had a below-average season.

**Table 3.20.3** Productivity of common terns expressed as chicks per pair 2001–2002 and 1986–2001 at selected sites referred to in the text. (- indicates no data available)

Region/site	2001	2002	1986–2001 mean ( $\pm$ s.e.)	No. of years
<b>SW Scotland</b>				
E an Ruig, L Feochan	2.33	2.29	2.29 (0.31)	4
Sgeir nan Caillich, L Melfort	0.68	0.71	0.80 (0.45)	4
G. Eileanan, Sd Mull	N/A	0.00	0.50 (0.17)	3
<b>NE Scotland</b>				
St Fergus	>0.21	0.07	0.17 (0.06)	9
Site X	0.51	1.00	0.66 (0.10)	4
<b>SE Scotland</b>				
Grangemouth	c.0.41	>0.16	0.44 (0.07)	7
<b>NE England</b>				
Coquet	1.83	1.97	1.03 (0.15)	16
Farnes	0.30	0.23	0.74 (0.21)	6
<b>C England</b>				
Rye Meads	1.38	1.32	1.59 (0.21)	6
<b>E England</b>				
Hoveton Great Broad	1.04	1.48	-	-
Snettisham	0.59	0.09	0.38 (0.13)	10
Holkham	0.44	0.04	0.55 (0.15)	11
Blakeney	1.07	0.27	0.56 (0.17)	10
<b>SE England</b>				
Pitts Deep – Hurst	-	>0.04	0.47 (0.12)	7
Langstone Harbour	0.35	0.08	0.64 (0.15)	14
Hayling Island	N/A	0.29	N/A	
<b>SW England</b>				
Brownsea Is	0.66	0.06	0.65 (0.07)	13
Lodmoor	1.88	c.1.00	1.84 (0.23)	4
<b>Wales</b>				
Shotton	1.45	1.05	1.36 (0.16)	13
Ynys Feurig	2.08	2.17	1.09 (0.22)	14
Cemlyn	-	0.07	0.45 (0.18)	7
<b>NW England</b>				
Seaforth	0.35	0.67	0.63 (0.08)	16
Rockcliffe	0.17	0.71	0.08 (0.03)	9
<b>NE Ireland</b>				
Belfast Lough	1.80	1.47	1.52 (0.27)	2
<b>SE Ireland</b>				
Rockabill	1.05	1.35	1.66 (0.16)	11
Dublin Port	1.48	1.24	1.54 (0.10)	4

Overall breeding success at **Welsh** colonies, although the lowest since 1997, remained high, with 1.20 chicks fledged per pair. However, constituent colonies experienced mixed fortunes; birds at Ynys Feurig (c.150 pairs) had their second highest productivity on record, whilst the smaller Cemlyn colony

(46 pairs) had a very unproductive season. Heavy rain during the critical hatching period reduced productivity at the largest colony at Shotton (555 pairs).

**North-west England** was one of the few regions to have a more successful year in 2002 than 2001. Although the weather was not good for the chicks at Seaforth – resulting in a moderate productivity for the 143 pairs – there was no repeat of the strong winds that severely affected the colony in 2001. In addition, the small Rockcliffe colony (17 pairs) has its most successful year on record.

The Belfast Lough colony, **north-east Ireland**, experienced another very productive year; 75 pairs fledged 110 young. In **south-east Ireland**, birds on Rockabill and at Dublin Port had a fairly successful – although below-average – year. In contrast, only 111 chicks were ringed from 461 pairs (167 pulli ringed; 322 pairs in 2001) at Lady's Island Lake, indicating it had been a less successful season there than in 2001.

**Table 3.20.4** Common tern productivity, grouped regionally, 2001–2002: 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	2001 chicks fledged/pair			2002 chicks fledged/pair		
	Pairs <sup>n</sup>	Range	Overall	Pairs <sup>n</sup>	Range	Overall
SW Scotland	>797 <sup>10</sup>	0.00-2.33	c.0.60	1,033 <sup>13</sup>	0.00-2.29	0.59
NW Scotland	95 <sup>8</sup>	0.00-3.00	0.72	177 <sup>11</sup>	0.00-1.50	0.32
N Scotland	<511 <sup>5</sup>	0.00-0.95	0.71	<568 <sup>8</sup>	0.00-0.01	0.00
NE Scotland	323 <sup>6</sup>	0.16-0.64	0.38	285 <sup>6</sup>	0.00-1.00	0.30
SE Scotland	143 <sup>2</sup>	0.21-0.41	>0.33	163 <sup>3</sup>	0.00-0.82	>0.38
<b>Total Scotland</b>	<b>1,869<sup>31</sup></b>	<b>0.00-3.00</b>	<b>0.58</b>	<b>2,226<sup>41</sup></b>	<b>0.00-2.29</b>	<b>&gt;0.36</b>
NE England	1,128 <sup>5</sup>	0.20-1.83	1.64	1,206 <sup>4</sup>	0.23-1.97	1.81
C England	45 <sup>1</sup>		1.38	47 <sup>1</sup>		1.32
E England	1,050 <sup>11</sup>	0.44-1.26	0.85	1,018 <sup>9</sup>	0.04-1.48	0.56
SE England	191 <sup>3</sup>	0.00-1.44	0.54	601 <sup>7</sup>	0.04-1.46	0.19
SW England	216 <sup>2</sup>	0.66-1.88	c.0.88	215 <sup>2</sup>	0.06-1.00	0.21
NW England	230 <sup>3</sup>	0.00-0.35	0.27	196 <sup>4</sup>	0.00-0.71	0.56
<b>Total England</b>	<b>2,860<sup>25</sup></b>	<b>0.00-1.88</b>	<b>1.11</b>	<b>3,283<sup>27</sup></b>	<b>0.00-1.97</b>	<b>0.94</b>
<b>Wales</b>	<b>755<sup>3</sup></b>	<b>1.45-2.08</b>	<b>1.60</b>	<b>843<sup>4</sup></b>	<b>0.07-2.17</b>	<b>1.20</b>
NE Ireland	25 <sup>1</sup>		1.80	75 <sup>1</sup>		1.47
SE Ireland	916 <sup>2</sup>	1.05-1.48	1.16	1,016 <sup>2</sup>	1.24-1.35	1.32

### 3.21 Arctic Tern *Sterna paradisaea*

*Regions showed considerable variation in changes in breeding numbers between 2001 and 2002. Of particular note were the large declines observed at some Shetland sites and on the Isle of May in south-east Scotland. However, numbers in west Scotland and north-east England were the highest for several years and the Welsh population reached a record high. Major breeding failures were experienced at colonies in Shetland and north Scotland due to an apparent shortage of sandeels and inclement weather. However, overall success at five sites on Orkney was the highest on record and Welsh colonies continued to be very productive.*

*Breeding numbers* (Tables 3.21.1 and 3.21.2)

An estimated 484 pairs bred at 14 colonies in **west Scotland** monitored as part of the Mink-Seabird Project, the highest since the project started in 1987 (the minimum number was 204 pairs, in 2001). Unusually, a large colony (1,350 pairs) established itself on Fladda, Sound of Luing (Craik 2002). Three other small south-west Scotland colonies had similar numbers to 2001 but total numbers at four further colonies in the north-west increased by 55% due to record numbers on the Isle of Eigg. In addition, a total census of colonies from north South Uist to south Harris, monitored as part of a mink removal programme, recorded 1,604 pairs (Evans & Allan 2003).

**Table 3.21.1** Population changes at monitored Arctic tern colonies, 2001–2002 (breeding pairs). Superscript = number of colonies/sites counted in both years. Regional samples <100 pairs not included.

Region	2001	2002	2001-2002
SW & NW Scotland	408	812	+99.0 <sup>29</sup>
Shetland	4,530	1,311	-71.1 <sup>7</sup>
Orkney	2,440	2,916	+19.5 <sup>4</sup>
N Scotland	263	238	-9.5 <sup>8</sup>
NE Scotland	570	621	+8.9 <sup>7</sup>
SE Scotland	917	238	-74.0 <sup>5</sup>
NE England	3,563	3,955	+11.0 <sup>3</sup>
Wales	1,763	2,000	+13.4 <sup>4</sup>
SE Ireland	180	c.275	+52.8 <sup>2</sup>

Trends observed from a relatively small proportion of the population monitored in Shetland and Orkney may not be representative of the regions as a whole. There was an overall decrease of 71% in breeding numbers at the seven sites monitored in **Shetland** in both 2000-2001 and 2001-2002. Numbers fell dramatically on Fair Isle following the record high population in 2001, to the lowest count for at least 15 years (Shaw *et al.* 2002) and there was a 50% decline on Foula (Furness 2002), to the lowest level since 1990. However, on Fetlar, numbers reached their highest for four years (Smith & Bellamy 2002). Counts from three additional sites could be compared with 1999 data (Croft & Marks 1999): 500–700 birds at Dalsetter, Mainland represented a 70% decline since then. Colonies did not form at Noss Hill and Mossy Hill in 1999, so 2002 counts (300–400 birds and 250–300 birds respectively) represented increases there.

In **Orkney**, the situation was different from in Shetland, with four sites – Papa Westray, Rousay, North Ronaldsay and Onziebust, Egilsay – showing an almost 20% increase between 2001 and 2002. The largest increases occurred at North Hill, Papa Westray and on North Ronaldsay. In addition, a complete census of Egilsay recorded 200 birds.

Overall numbers declined for the second consecutive year in **north Scotland**, the largest decline occurred at the largest colony, Nigg, where numbers had increased between 2000 and 2001. Numbers in **north-east Scotland**, however, recovered from the drop in 2001; the Sands of Forvie colony reached a record high and the number increased by 47% at St Fergus, although it was well below the long-term mean for the site. The large decline in **south-east Scotland** was attributed to events on the Isle of May, which recorded its lowest breeding population since 1988; severe weather at the beginning of the season may have contributed to this (Wilson *et al.* 2002).

Numbers increased at all monitored sites in **north-east England** – Coquet, the Farnes and Long Nanny – and the region's total was the highest since 1995. In addition, 60 common/Arctic terns were recorded at Lindisfarne, compared with 30–35 in 2001. In **east England** two sites held a total of seven pairs in 2002, compared with 24 pairs at four sites in 2001. In **north-west England**, numbers on Foulney increased for the first time since 1995.

**Table 3.21.2** Population changes of Arctic terns 2001–2002 and 1986–2001 at selected sites referred to in the text. (P = pairs; I = individuals).

Region/Site		2001	2002	% Change 2001–2002	1986–2001 Mean ( $\pm$ s.d.)	No. years
<b>SW Scotland</b>						
Fladda, Sd Luing	P	c.50	c.350	+600.0	49.4 (56.9)	8
<b>NW Scotland</b>						
Isle of Eigg	P	71	c.190	+167.6	45 (32.1)	15
<b>Shetland</b>						
Fair Isle	P	2,836	115	-95.9	966 (684)	15
Foula	P	800	400	-50.0	751 (414)	15
Fetlar	P	350	480	+37.1	541 (359)	12
<b>Orkney</b>						
North Hill	P	1,076	1,506	+40.0	2,386 (1,122)	14
North Ronaldsay	I	413	1,111	+169.0	-	-
Rousay	I	920	300	-67.4	-	-
Onziebust	P	16	5	-68.7	-	-
<b>N Scotland</b>						
Nigg	P	169	113	-33.1	95 (64.4)	12
<b>NE Scotland</b>						
Sands of Forvie	P	212	257	+21.2	78 (53.0)	13
St Fergus	P	120	176	+46.7	333 (155)	15
<b>SE Scotland</b>						
Isle of May	P	916	228	-75.1	484 (248)	16
<b>NE England</b>						
Coquet	P	752	874	+16.2	638 (156)	16
Farnes	P	1,088	1,301	+19.6	2,696 (954)	16
Long Nanny	P	1,723	1,780	+3.3	432 (518)	14
<b>Wales</b>						
Ynys Feurig	P	c.307	c.436	+42.0	225 (64.4)	16
Skerries	P	c.1,440	1,555	+8.0	779 (385)	16
<b>NW England</b>						
Foulney	P	c34	43	+26.5	42 (12.8)	15
<b>NE Ireland</b>						
Carlingford Lough	P	35	27	-22.9	17 (14.8)	16
Big Copeland	P	-	542	-	318 (197)	10
<b>SE Ireland</b>						
Rockabill	P	20	87	+335.0	30 (34)	16
Lady's Island Lake	P	160	c.188	+17.5	160 (160)	12

The population of Arctic terns in **Wales** increased by 13% between 2001 and 2002, reaching its highest on record. The two largest colonies – Ynys Feurig and the Skerries – continued to expand, following several years of high productivity.

In **north-east Ireland** comparison with 2001 was only possible for one small colony; at Carlingford Lough numbers fell 23%, but remained above average, in 2002. The 542 pairs recorded on Big Copeland was 17% lower than in 1999 and 2000. In **south-east Ireland** the number on Rockabill returned to 1999–2000 levels, following the low number in 2001 that was due to gull predation. The number increased 18% at Lady's Island Lake, to an estimated 188 pairs.

#### *Breeding success* (Tables 3.21.3 and 3.21.4)

South-west Scotland, Orkney and Wales were the only regions to experience above-average productivity in 2002. There were major breeding failures in Shetland, north and north-east Scotland, due, it is thought, to a severe shortage of sandeels and to bad weather.

The 481 pairs monitored in **south-west Scotland** for the Mink-Seabird Project fledged, on average, 0.73 per pair, the highest since 1995, due to the success at the large naturally mink-free colony on Fladda (350 pairs). Other colonies in the project suffered from severe predation by otters (Craik 2002). Two further colonies in the region (total 60 pairs) failed completely. In **north-west Scotland** productivity was monitored at only two sites. On the Isle of Eigg many 1–3 day-old chicks were found dead in early July resulting in the lowest productivity on record for the region.

Overall, birds in **Shetland** were more successful than in 2001, although productivity remained below the already low average (1986–2001 mean = 0.24, s.e. = 0.06). The majority of monitored sites fledged at most a handful of young. Reports from Foula, Fair Isle, Mousa and Mainland sites (total c.625 pairs) indicated that there was a severe lack of available sandeels at the beginning of the season, and the weather was inclement. However, on Fetlar, food was apparently abundant and the 480 pairs there had their most productive season since 1991.

Birds in **Orkney** in 2002 had the highest overall productivity on record for the region (1989–2001 mean = 0.27, s.e. = 0.06), although data were only available from five sites. The majority of the birds bred on Papa Westray with the large North Hill colony (1,506 pairs) being especially successful. Rousay (c.200 pairs) and a small Egilsay colony (5 pairs) provided additional data.

All eight colonies monitored in **north Scotland** failed completely, the least productive year on record for the region. A lack of food, followed by inclement weather and human disturbance were cited as the main reasons for failure (Butterfield 2002).

Colonies in **north-east Scotland** colonies had a below-average season in 2002. Birds at the largest colony, Forvie (257 pairs), experienced near average productivity, with 0.39 chicks per pair. However, at the two other sizeable colonies in the region an apparent lack of food led to desertion of 120 pairs at Kinloss, and there was severe predation by crows at St Fergus (176 pairs).

There was also total breeding failure at five colonies in **south-east Scotland**. The reason for this remained uncertain at the largest colony, on the Isle of May (228 pairs). Gull predation, exacerbated by the reduced size of the colony in 2002, were thought to be contributory factors but there were also several incidences of adults abandoning breeding attempt (Wilson *et al.* 2002).

Despite birds on the Farnes having a more successful year than 2001 (from a sample of 341 nests), overall productivity in **north-east England** was below average (1990–2001 mean = 0.67, s.e. = 0.08). Coquet (n=250) recorded its lowest productivity for four years. The largest colony in the region - Long Nanny (1,780 pairs) - was also less successful than in 2000 and 2001 - predation and poor weather led to an estimated 0.45–0.90 chicks fledged per pair (Cottam & Wakefield 2002). Low productivity recorded at the one small **east England** colony was similar to the 1998 level. Birds on Foulney in **north-west England** had their most successful year since 1992, with 43 pairs fledging 0.81 chicks per pair.

Productivity at the two major colonies in **Wales**, the Skerries (1,555 pairs) and Ynys Feurig (c.436 pairs), continued to be extremely high. Since 1997, overall productivity for the region has averaged 1.47 chicks per pair (s.e. = 0.05).

No definite productivity figures were available for Big Copeland, **north-east Ireland**, but up to 400 chicks were thought to have fledged from 542 pairs (650 pairs fledged at least one chick per pair in 1999).

Birds at Rockabill **south-east Ireland** had a relatively unproductive year in 2002 with 0.66 chicks per pair from 87 pairs; nevertheless they were more productive than in 2001. Ringing totals from the Lady's Island Lake colony indicated that it had been another unsuccessful year - only 38 chicks were ringed from an estimated 188 pairs.



**Table 3.21.3** Productivity of Arctic terns expressed as chicks per pair during 2001–2002 and 1986–2001 at selected sites referred to in the text.

Region/site	2001	2002	1986–2001 mean ( $\pm$ s.e.)	No. of years
<b>SW &amp; NW Scotland</b>				
Fladda	0.00	0.90	-	-
Isle of Eigg	0.42	0.02	0.18 (0.09)	5
<b>Shetland</b>				
Foula	0.00	0.01	0.17 (0.06)	14
Fair Isle	0.00	0.00	0.30 (0.09)	13
Mousa	0.00	0.01		
Fetlar	0.01	0.46	0.12 (0.06)	11
<b>Orkney</b>				
North Hill, Papa Westray	0.00	1.05	0.11 (0.06)	8
<b>NE Scotland</b>				
Sands of Forvie	0.74	0.39	0.31 (0.11)	11
Kinloss	-	0.00	0.21 (0.09)	8
St Fergus	0.00	0.03	0.10 (0.04)	10
<b>SE Scotland</b>				
Isle of May	>0.12 'commics'	0.00	0.36 (0.08)	10
<b>NE England</b>				
Farnes	0.28	0.64	0.54 (0.16)	6
Coquet	1.08	0.53	0.77 (0.09)	12
Long Nanny	1.13	0.45–0.90	0.69 (0.15)	12
<b>Wales</b>				
Skerries	1.70	1.41	1.06 (0.12)	12
Ynys Feurig	1.63	1.43	0.88 (0.16)	13
<b>NW England</b>				
Foulney	0.29	0.81	0.31 (0.06)	16
<b>SE Ireland</b>				
Rockabill	0.50	0.66	1.07 (0.15)	6

**Table 3.21.4** Arctic tern productivity, 2001–2002, 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 □	2001 chicks fledged/pair			2002 chicks fledged/pair		
	Pairs <sup>n</sup>	Range	Overall	Pairs <sup>n</sup>	Range	Overall
SW Scotland	199 <sup>7</sup>	0.00–0.69	<0.43	541 <sup>15</sup>	0.00–2.00	0.66
NW Scotland	101 <sup>5</sup>	0.00–1.50	0.33	194 <sup>2</sup>	0.00–0.02	0.02
Shetland	4,200 <sup>6</sup>	0.00–0.02	0.00	2,722 <sup>14</sup>	0.00–0.46	0.11
Orkney	2,181 <sup>6</sup>	0.00–0.50	0.01	2,395 <sup>5</sup>	0.00–1.05	0.86
N Scotland	276 <sup>7</sup>	0.00–1.70	0.68	238 <sup>8</sup>		0.00
NE Scotland	365 <sup>4</sup>	0.00–0.74	c.0.44	583 <sup>5</sup>	0.00–0.39	0.19
SE Scotland	1 <sup>1</sup>		0.00	238 <sup>5</sup>		0.00
NE England	3,563 <sup>3</sup>	0.28–1.13	0.86	2,175 <sup>2</sup>	0.53–0.64	0.59
E England	24 <sup>4</sup>	0.67–1.50	1.00	6 <sup>1</sup>		0.17
Wales	1,748 <sup>3</sup>	0.00–1.70	c.1.69	1,994 <sup>3</sup>	0.00–1.43	c.1.42
NW England	34 <sup>1</sup>		c.0.29	43 <sup>1</sup>		0.81
SE Ireland	20 <sup>1</sup>		<0.50	87 <sup>1</sup>		0.66

### 3.22 Little tern *Sterna albifrons*

*Breeding numbers in east Scotland and north-east England were high, but in east England, the normally large colony at Great Yarmouth was much reduced.. In south-east England, Wales and south-east Ireland, although birds were present early in the season, they delayed breeding or did not nest at all. All regions except Wales had a below-average breeding season; birds in Scotland were particularly unproductive. Poor weather, high tides and predation were the main causes.*

*Breeding numbers (Tables 3.22.1 and 3.22.2)*

Foot and mouth restrictions in 2001 meant there were only two sites in **west Scotland** where comparison with 2002 data could be made – numbers fell by 21% to 15 pairs on the Coll reserve, and fell by just one pair at Balranald. However, a minimum of 63 pairs bred on Tiree in 2002, compared to 53 in 2000 and 59 in 1999. In the first of a five-year project investigating the effect of mink control in the Western Isles, 128 pairs were counted in a full census between north South Uist and south Harris (Evans & Allan 2003).

The small **Orkney** population remained stable with 2–3 pairs breeding at two sites. Numbers at two sites in **north Scotland** fell 92% to one pair in 2002; for the first time since 1985 no birds bred at Dalchalm, Sutherland.

In **east Scotland**, the Sands of Forvie colony continued the upward trend of the previous three years, reaching a record high of 76 pairs. However, in the south of the region there was no reversal of the recent decline, with just three pairs breeding at one site.

The overall number in **north-east England** reached its highest level since 1995 although there was variation between individual colonies. The 59 pairs at Saltfleetby were disturbed by humans and most moved elsewhere. This probably accounted for the increases seen at Gibraltar Point and Tetney. The Cleveland population strengthened in 2002, with 45 pairs at Crimden Dene, approaching the highs of the late 1990s. Long Nanny (Northumberland) had the highest numbers for ten years whereas following two unsuccessful years, the Easington colony (Humberside) was at its lowest for ten years.

The overall number in **east England** fell for the third year in succession due to events at the Great Yarmouth colony; by the end of May only 98 nests had been recorded there, which has held over 200 pairs in most years since 1988. Thereafter, vandals destroyed most of the colony so that only eight nests remained. Birds probably re-laid at nearby Winterton Dunes, where 240 individuals were reported, a 490% increase on 2001. Overall numbers at 18 other colonies where comparisons with 2001 were possible actually increased by 10% between 2001 and 2002. The largest increase occurred at Benacre, Suffolk, with a record 80 pairs.

Only four pairs at one colony were recorded in Kent, **south-east England** compared with at least 33 pairs at three colonies in 2001. This was the lowest total on record for the county. Additional birds had been present early in the season, but moved on before breeding. Furthermore, 19 pairs recorded at Rye Harbour, Sussex, continued the long-term decline of this colony. Only colonies within the Langstone Harbour area, Hants, showed an overall increase – up 7% to 138 pairs; most birds again nesting on the recently created Hayling Island.

Numbers remained stable at Chesil Bank, **south-west England** with 65 pairs. This was lower than numbers breeding during 1994–2000 but equal to the long-term mean for the colony.

Following several above-average years, the colony at Gronant, **Wales**, declined by a third between 2001 and 2002.

**Table 3.22.1** Population changes at monitored little tern colonies, 2001–2002 (breeding pairs).

Regional samples &lt; 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	2001	2002	2001-2002
E Scotland	82	85	+3.7 <sup>4</sup>
NE England	176	215	+22.2 <sup>11</sup>
E England	788	<i>c.</i> 721	-8.5 <sup>20</sup>
SE England	238	201	-15.5 <sup>7</sup>
SW England	65	65	0.00 <sup>1</sup>
Wales	85	<i>c.</i> 57	-32.9 <sup>1</sup>
Great Britain*	1,434	1,344	-6.3 <sup>44</sup>
SE Ireland	40	40	0.00 <sup>1</sup>

**Table 3.22.2** Population changes of little terns 2001–2002 and 1986-2001 at selected sites referred to in the text.

Region/Site	2001	2002	% Change 2001-2002	1986-2001 Mean ( $\pm$ s.d.)	No. years
<b>N Scotland</b>					
Dalchalm	<i>c.</i> 11	0	-100.0	12 (13.2)	12
<b>E Scotland</b>					
Sands of Forvie	72	76	+5.6	30 (20.0)	16
<b>NE England</b>					
Saltfleetby	10	3	-70.0	6 (7.6)	16
Gibraltar Point	34	49	+44.1	24 (15.2)	16
Tetney	0	16	-	32 (33.2)	16
Crimden Dene	22	45	+104.5	15 (22.8)	16
Long Nanny	43	50	+16.3	36 (13.2)	16
Easington Lagoon	44	34	-22.7	39 (20.0)	16
<b>E England</b>					
Great Yarmouth	245	98	-60.0	194 (62.0)	16
Winterton Dunes	24	124–160	+491.7	22 (3.5)	2
Benacre	20	80	+300.0	11 (15.7)	14
<b>SE England</b>					
Rye Harbour	26	19	-26.9	37 (16.0)	16
Hayling Oysterbeds	115	122	+6.1	56 (58.8)	5
<b>SW England</b>					
Chesil Bank	65	65	0.0	64 (23.2)	16
<b>Wales</b>					
Gronant	85	<i>c.</i> 57	-32.9	61 (70.4)	16
<b>NW England</b>					
Hodbarrow	20	24	+20.0	18 (8.0)	16
Foulney Is	0	1	-	11 (11.2)	16
<b>SE Ireland</b>					
Kilcoole	40	40	0.0	32 (10.8)	15

Breeding counts were received only from two colonies in **north-west England**. Numbers increased at Hodbarrow by 20%, between 2001 and 2002, to an above-average 24 pairs. However, no count was available for the nearby colony at Haverigg. Elsewhere in Cumbria, a pair was recorded on Foulney - the first to breed there since 1997.

In **south-east Ireland**, the number at Kilcoole, Co. Wicklow, was stable, at 40 pairs. Most eggs there were laid later than usual, perhaps due to inclement weather (Kerr *et al.* 2002).

*Breeding success* (Table 3.22.3, Table 3.22.4)

With the exception of Wales, all regions had a below-average season with productivity generally similar to or lower than 2001. Overall breeding success at 12 colonies in Scotland was very low, at 0.08 chicks per pair – the lowest recorded since 1991 (1986–2001 mean = 0.38, s.e. = 0.06). Despite a successful year in Wales, overall English and Welsh productivity was below-average (1986–2001 mean = 0.50, s.e. = 0.04). Birds at the south-east Ireland colony experienced their least productive year since 1994.

Breeding success in **south-west Scotland** was the lowest since 1994. On Coll and Tiree, bad weather in June was blamed for failures at the egg stage for many of the 78 pairs. The only colony to have anything like a productive season – seven pairs on an islet off Tiree – fledged five chicks in a second attempt.

In **Orkney** two to three pairs together fledged one chick, similar to the previous four years. The only productivity data available for **north Scotland** was for one pair at Loch Fleet, which failed.

Birds in **north-east Scotland** had an extremely unproductive season in 2002 – not one chick fledged from 82 pairs, the least successful year since 1994 (as was 2001). Reasons for failure at the Forvie colony were unknown, but at Lossiemouth disturbance probably caused the losses of six pairs (Butterfield 2002). The three pairs in **south-east Scotland** were washed out by high tides.

Predation reduced productivity at the three largest colonies in **north-east England**. The most severely affected was Long Nanny (50 pairs fledged one chick), where fox *Vulpes vulpes* and carrion crow *Corvus corone* predation of eggs was severe and where a single kestrel *Falco tinnunculus* took 66 chicks. Fox and increasing kestrel predation depressed productivity at Gibraltar Point, although 49 pairs fledged an above-average 0.51 chicks per pair. Mustelids were suspected of taking chicks at Crimden Dene (45 pairs fledged 25). The 34 pairs at Easington Lagoons, however, fledged 0.94 chicks per pair – the third highest since 1998 – due to benign weather and the absence of fox predation (Stoye 2002). Fine weather, electrified netting and chick shelters on Lindisfarne helped the eight pairs there to have their most successful year since 1988.

In **east England**, productivity of the 98 pairs that bred at Great Yarmouth before the colony was vandalised was 0.05 chicks per pair; the eight pairs remaining fledged five young. The birds that relocated to Winterton Dunes had some success, however – 240 birds fledged 58 chicks. High tides and predation led to an unproductive year for the three large north Norfolk colonies – 297 pairs fledged 0.18 chicks per pair, overall, compared with 0.38 per pair in 2001. However, there were two successful colonies in 2002: 80 pairs at Benacre, Suffolk, fledged 100 young and productivity of 49 pairs at Hamford Water was 1.18 chicks per pair.

With the exception of two pairs at Chichester Harbour that fledged two chicks, no colony in **south-east England** had a productive year. Bad weather during the chick stage caused productivity at the large Hayling Island colony (122 pairs) to be well below usual levels, whilst flooding caused 14 pairs at Langstone Harbour to fail completely. Fox and kestrel predation were prevalent at Rye Harbour (19 pairs fledged six young).

Chesil, the only colony in **south-west England**, had another unsuccessful year in 2002 – 65 pairs fledged six young. Again clutches there failed to hatch (data loggers in nests showed low levels of incubation at night), but fox predation was the major cause of loss.

In **Wales**, the colony at Gronant had an above-average year, with a mean productivity of 1.09 chicks per pair. Nests were protected from high tides and night patrols were successful in reducing fox predation.

**North-west England** was one of the only regions in 2002 to have had a more successful year than 2001. The 24 pairs at Hodbarrow fledged at least four young, the highest productivity since 1998. The pair on Foulney fledged two chicks.

Following three highly productive years, the Kilcoole colony, **south-east Ireland** had in 2002 its least productive season since 1994. Foxes entered the colony after the electric fence broke down and only 12 chicks fledged from 40 pairs.

**Table 3.22.3** Breeding success (chicks fledged per pair) of little terns 2001–2002 and 1986–2001 at selected sites referred to in the text.

Region/site	2001	2002	1986–2001 mean ( $\pm$ s.e.)	No. of years
<b>N Scotland</b>				
Loch Fleet	1.00	0.00		
<b>NE Scotland</b>				
Sands of Forvie	0.15	0.00	0.34 (0.09)	15
Lossiemouth	-	0.00	1.00 (0.58)	3
<b>NE England</b>				
Long Nanny	0.28	0.02	0.60 (0.13)	16
Gibraltar Point	0.47	0.51	0.29 (0.07)	16
Crimden Dene	1.45	0.56	0.67 (0.28)	7
Easington Lagoons	0.07	0.94	0.41 (0.11)	16
Lindisfarne	0.00	1.00	0.60 (0.20)	14
<b>E England</b>				
Great Yarmouth	0.42	0.05	0.76 (0.15)	16
Winterton Dunes				
Benacre	1.15	1.25	0.36 (0.23)	6
Hamford Water	2.00	1.18	0.87 (0.23)	7
<b>SE England</b>				
Chichester Harbour	N/A	1.00	0.16 (0.09)	12
Hayling Island, Langstone	1.56	0.24	1.63 (0.31)	4
Langstone Harbour	0.93	0.00	0.41 (0.11)	16
Rye Harbour	0.77	0.30	0.32 (0.09)	15
<b>SW England</b>				
Chesil Bank	0.08	0.09	0.31 (0.05)	16
<b>Wales</b>				
Gronant	0.01	1.09	0.87 (0.16)	16
NW England				
Hodbarrow	0.00	>0.17	0.31 (0.09)	16
<b>SE Ireland</b>				
Kilcoole	2.00	0.30	0.90 (0.19)	15

**Table 3.22.4** Little tern breeding success, 2001–2002, 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	2001 chicks fledged/pair			2002 chicks fledged/pair		
	pairs <sup>n</sup>	range	overall	pairs <sup>n</sup>	range	overall
SW Scotland	-		-	78 <sup>6</sup>	0.00-0.71	0.17
Orkney	2 <sup>2</sup>		0.00	2 <sup>2</sup>	0.00-1.00	0.50
N Scotland	12 <sup>2</sup>	0.55-1.00	0.58	1 <sup>1</sup>		0.00
NE Scotland	72 <sup>1</sup>		0.15	82 <sup>2</sup>		0.00
SE Scotland	3 <sup>1</sup>		0.00	3 <sup>1</sup>		0.00
Scotland total	89 <sup>6</sup>	0.00-1.00	0.20	166 <sup>12</sup>	0.00-1.00	0.08
NE England	176 <sup>9</sup>	0.00-1.45	0.40	221 <sup>12</sup>	0.00-1.00	0.42
E England	720 <sup>17</sup>	0.00-2.00	0.47	610 <sup>12</sup>	0.00-1.25	>0.46
SE England	238 <sup>6</sup>	0.00-1.56	1.03	201 <sup>6</sup>	0.00-1.00	0.24
SW England	65 <sup>1</sup>		0.08	65 <sup>1</sup>		0.09
Wales	85 <sup>1</sup>		0.01	57 <sup>1</sup>		1.09
NW England	20 <sup>1</sup>		0.00	25 <sup>2</sup>	0.17-2.00	>0.24
England and Wales total	1,304 <sup>35</sup>	0.00-2.00	0.51	1,179 <sup>34</sup>	0.00-2.00	>0.42
SE Ireland	40 <sup>1</sup>		2.00	40 <sup>1</sup>		0.30

### 3.23 Common guillemot *Uria aalge*

Between 2001 and 2002, numbers of adult common guillemots in study plots and at whole colonies showed slight increases in most regions, with many colonies in the vicinity of the Irish Sea recording their highest counts since monitoring began. However, large declines were noted in study plots in Shetland and at whole colonies in south-east Scotland. Average breeding performance across 11 monitored colonies was 0.75 chicks fledged per breeding pair, higher than that recorded in 2001 and close to the long-term mean.

*Breeding numbers* (Tables 3.23.1 and 3.23.2, Figure 3.23.1)

In **Shetland**, large declines noted in study plots at several colonies were attributed to low attendance of adults on breeding ledges, a phenomenon reported to have been prevalent throughout the region. Significant decreases were thus noted at Hermaness (24.3%,  $t=6.068$ , d.f.=6,  $P<0.001$ ) and Noss (22.8%,  $t=7.245$ , d.f.=8,  $P<0.001$ ), and in the SOTEAG monitoring plots at Burravoe (31.4%,  $t=5.206$ , d.f.=8,  $P<0.001$ ), Troswick Ness (15.7%,  $t=2.493$ , d.f.=8,  $P<0.05$ ) and Sumburgh Head (25.2%,  $t=5.555$ , d.f.=8,  $P<0.001$ ), with a non-significant decrease at Eshaness. However, an increase was recorded in study plots on Fair Isle, although the change was non-significant (Shaw *et al.* 2002). The population index for the region is currently equal to that of 1990, the lowest values recorded in the history of the Seabird Monitoring Programme.

In **south-west Scotland**, there appeared to be a large increase between 2001 and 2002 at the Mull of Galloway, where numbers have generally been increasing since 1986 (P. Collin, pers. comm.). On Handa (**north-west Scotland**), a significant decrease (6.6%,  $t=4.531$ , d.f.=8,  $P<0.01$ ) was noted in study plots since 2001, although the index for this region has generally shown an increasing trend since 1989. The population index for **south-east Scotland** has also been increasing since the late 1980s, although there has been much variation since 1995, with a more or less level trend in recent years. Between 2001 and 2002, a non-significant increase was recorded in study plots at St Abb's Head, but combined whole-colony counts fell over the same period. The proportional decreases on the Lamb, Craigleith, Bass Rock and Isle of May were noteworthy, with those at the two former sites being particularly large (Jones 2002; Moeller-Holtkamp 2002). Adjacent to this region, in **north-east**

**England**, where the trend has been one of increase for over a decade, a whole-colony count of the Farne Islands reached a new peak (Walton 2002).

**Table 3.23.1** Regional population changes at monitored common guillemot colonies, 2001-2002 (adults attending colony in first three weeks of June). Trends for 1986-2001 are average annual rates of change observed in sample populations. Significance of trends is indicated as: n.s. not significant, \*\*  $P < 0.01$ , \*\*\*  $P < 0.001$ ). 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	2002	2001-2002 % change	% annual change
NW Scotland <sup>a</sup>	3,654	3,414	-6.6	+1.2** 1986-2001
Shetland <sup>b</sup>	10,245	8,499	-17.0	+0.0 n.s. 1986-2001
SE Scotland <sup>c</sup>	1,886	1,921	+1.9	+3.6*** 1986-2001
Wales <sup>d</sup>	10,946	11,626	+6.2	+5.6*** 1986-2001

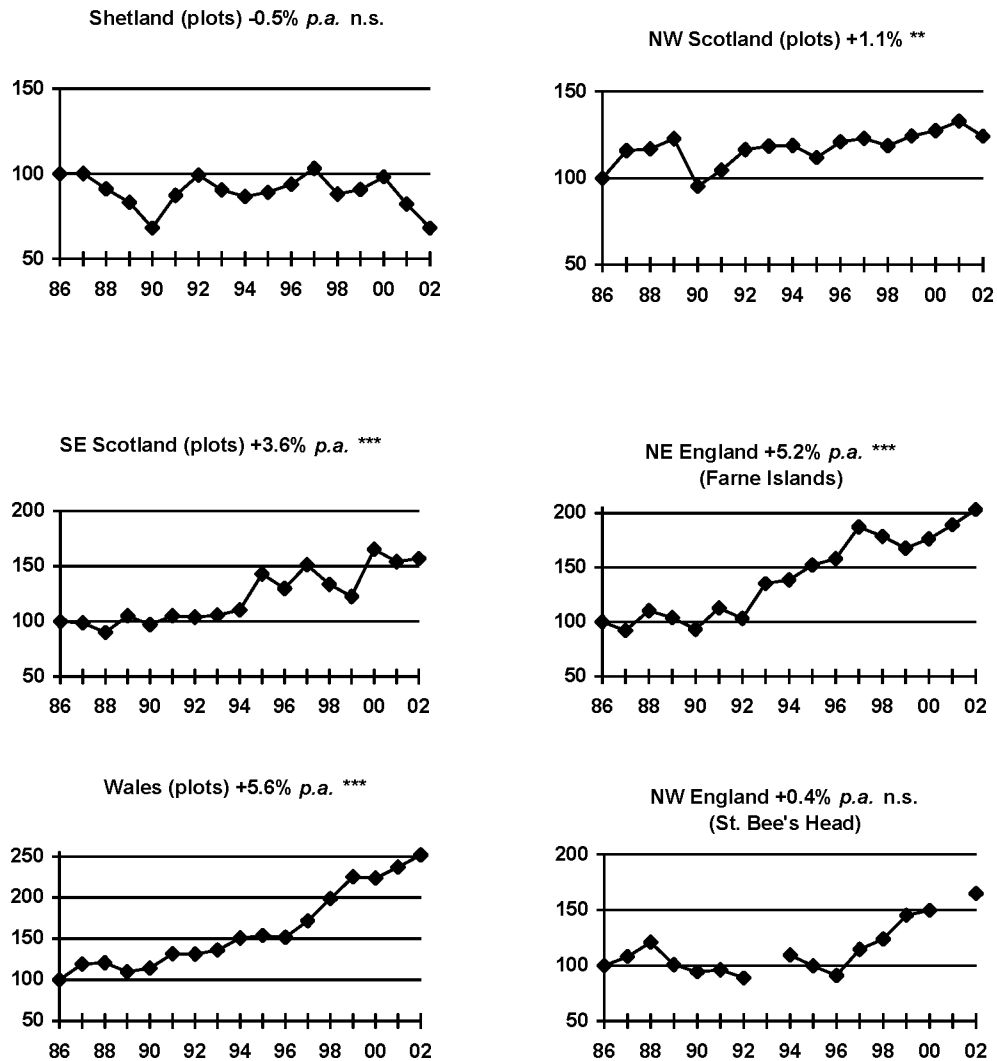
Colonies: <sup>a</sup> Handa; <sup>b</sup> Hermaness, Burra, Eshaness, Noss, Troswick Ness, Sumburgh Head, Fair Isle; <sup>c</sup> St Abb's Head; <sup>d</sup> South Stack, Skomer, Skokholm, Stackpole Head NNR, Eileag Stacks.

**3.23.1b** Whole-colony counts of common guillemots, grouped regionally. 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 Eileag Stacks.

Region	2001	2002	2001-2002 % change	% annual change
SE Scotland <sup>a</sup>	37,876	30,515	-19.4	+3.6*** 1986-2001
NE England <sup>b</sup>	35,436	38,056	+7.4	+5.3*** 1986-2001
Wales <sup>c</sup>	26,633	28,339	+6.4	+5.4*** 1986-2001
SW England <sup>d</sup>	1,570	1,649	+5.0	-

Colonies: <sup>a</sup> Isle of May, Inchkeith, Craigleith, Fidra, The Lamb, Bass Rock; <sup>b</sup> Farne Islands; <sup>c</sup> Stackpole Head NNR, Eileag Stacks and nearby coast, Skokholm, Skomer, Bardsey; <sup>d</sup> St Aldhelm's - Durlston, Berry Head (peak June count).

In **Wales**, the overall increase in the number of birds in study plots mirrored the increase noted from whole-colony counts, continuing the steady climb in the regional population trend. In study plots, increases were recorded at four of five monitored colonies between 2001 and 2002, although only at Eileag Stacks was this increase significant (28.0%,  $t=5.566$ , d.f.=8,  $P<0.001$ ). A significant decrease was noted in study plots at Stackpole Head NNR (14.0%,  $t=2.577$ , d.f.=8,  $P<0.05$ ), where a slight increase was noted in the whole-colony count since 2001. Over the same period, whole-colony counts increased at Eileag Stacks, Skokholm, Skomer and Bardsey, with the numbers recorded the highest on record at each colony. Two other colonies bordering the Irish Sea also reported record high counts; numbers at St Bee's Head (**north-west England**) totalled 8,080 birds (an increase of 10.1% since 2000) and on the Isle of Muck (**north-east Ireland**) the population doubled to 1,321 birds (also since 2000). The population index for north-west England has now been increasing steadily since 1996 after a decade when the trend was more or less level. At present, there has been no detectable decrease in the numbers of guillemots in western colonies, which had been anticipated after the *Erika* oil spill in December 1999; in fact the trends for most western regions is upward.



**Figure 3.23.1** Regional population indices for breeding common guillemots, 1986-2002 (counts of adults in June). Average annual rates of change were calculated by regression of natural log of index against year (see section 1.2.2. for details). Statistical significance of trends (t-test) indicated as: n.s. not significant, \*\*  $P < 0.01$ , \*\*\*  $P < 0.001$ .



**Table 3.23.2** Population changes of common guillemots 2001-2002 and 1986-2001 at selected sites referred to in the text. P\W indicates plot or whole-colony counts.

Region/Site		2001	2002	% change 2001-2002	1986-2001 Mean ( $\pm$ s.d.)	No. years
<b>SW Scotland</b>						
Mull of Galloway	W	1,746	3,117	+78.5	1,574 (481)	16
<b>NW Scotland</b>						
Handa	P	3,653	3,413	-6.6	3,458 (164)	4
<b>Shetland</b>						
Noss	P	2,576	1,987	-22.8	2,684 (220)	16
Hermaness	P	2,586	1,958	-24.3	3,132 (428)	7
Eshaness	P	360	297	-17.5	383 (52)	16
Troswick Ness	P	351	296	-15.7	346 (28)	13
Sumburgh Head	P	1,809	1,353	-25.2	1,596 (304)	16
Burraoe	P	194	133	-31.4	202 (31)	14
Fair Isle	P	2,369	2,475	+4.5	2,727 (442)	12
<b>SE Scotland</b>						
Forth Islands total	W	6,123	3,186	-47.7	-	-
Craigleith	W	3,180	1,558	-51.0	1,798 (692)	12
The Lamb	W	2,180	990	-55.6	3,079 (629)	15
Isle of May	W	28,103	24,369	-13.3	21,274 (4,412)	16
Bass Rock	W	3,650	2,960	-18.9	3,408 (647)	5
St Abb's Head	P	1,886	1,921	+1.9	1,512 (297)	13
<b>NE England</b>						
Farne Islands	W	35,436	38,056	+7.4	25,738 (6,661)	16
<b>SW England</b>						
St Aldhelm's-Durlston	W	617	791	+28.2	515 (67)	14
Berry Head	W	953	858	-10.0	854 (139)	8
<b>Wales</b>						
Elegug Stacks	P	2,510	3,212	+28.0	1,788 (456)	14
	W	8,023	8,771	+9.3	6,169 (1,423)	9
Stackpole Head	P	455	391	-14.0	390 (71)	6
	W	1,074	1,103	+2.7	954 (115)	12
Skokholm	P	351	359	+2.3	301 (46)	8
	W	981	1,157	+17.9	683 (214)	11
Skomer	P	4,101	4,128	+0.6	2,419 (946)	16
	W	14,281	14,434	+1.1	8,933 (2,762)	16
South Stack	P	3,527	3,535	+0.2	3,059 (270)	16
Bardsey	W	609	754	+23.8	365 (180)	13

A small increase was noted in whole-colony counts in **south-west England**, where numbers between St Aldhelm's and Durlston increased by 28.2% to 791 individuals (Morrison 2002), although elsewhere in the region a decline was recorded at Berry Head.

#### *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. In 2002, average breeding performance across 11 monitored colonies was 0.75 (s.e.  $\pm$  0.02) chicks fledged per breeding pair, higher than that recorded in 2001 (0.66, s.e. 0.04) and close to the long-term mean of 0.73 (s.e.  $\pm$  0.01) from between three and 15 colonies monitored annually during 1986-2001.

**Table 3.23.3** Breeding success of common guillemot, 2001-2002 and colony averages 1986-2001: 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.

Colony	Colony average 1986-2001			2001 chicks fledged/pair			2002 chicks fledged/pair			2001-2002 change	
	Years	Mean	±s.e.	Sites <sup>n</sup>	Mean	±s.e.	Sites <sup>n</sup>	Mean	±s.e.	Mean	±s.e.
Handa	14	0.70	±0.02	207 <sup>3</sup>	0.69	±0.04	241 <sup>3</sup>	0.70	±0.05	+0.01	-
Sumburgh Head	13	0.67	±0.02	144 <sup>1</sup>	0.66	-	134 <sup>1</sup>	0.64	-	-0.02	-
Fair Isle	15	0.74	±0.02	174 <sup>2</sup>	0.62	±0.10	169 <sup>2</sup>	0.72	±0.06	+0.10	-
Papa Westray	12	0.68	±0.04	111 <sup>1</sup>	0.42	-	119 <sup>1</sup>	0.73	-	+0.31	-
Marwick Head	15	0.72	±0.01	78 <sup>1</sup>	0.69	-	89 <sup>1</sup>	0.73	-	+0.04	-
Mull Head	12	0.72	±0.02	95 <sup>1</sup>	0.72	-	94 <sup>1</sup>	0.74	-	+0.02	-
North Sutor	8	0.68	±0.04	114 <sup>2</sup>	0.52	±0.03	24 <sup>1</sup>	0.83	-	+0.31	-
Isle of May	16	0.78	±0.02	975 <sup>5</sup>	0.63	±0.01	955 <sup>5</sup>	0.68	±0.02	+0.05	-
Durlston	6	0.84	±0.02				64 <sup>1</sup>	0.83	-	-	-
Skokholm	6	0.88	±0.03	110 <sup>1</sup>	0.97	-	113 <sup>1</sup>	0.88	-	-0.09	-
Skomer	13	0.73	±0.02	259 <sup>5</sup>	0.65	±0.08	244 <sup>5</sup>	0.72	±0.05	+0.07	-
<b>Total</b> no colonies	-	-	-	2,267 <sup>10</sup>	<b>0.66</b>	±0.04	2,246 <sup>11</sup>	<b>0.75</b>	±0.02	<b>+0.08<sup>10</sup></b>	±0.04

Compared with 2001, productivity was higher at eight colonies, with breeding success at most individual colonies close to their respective long-term means. Productivity at both Papa Westray (**Orkney**) and North Sutor (**north Scotland**) was higher than in 2001, and was the highest yet recorded at the latter site (Swann 2002b). After the very successful breeding season on Skokholm (**Wales**) in 2001 breeding success returned to more normal levels in 2002.

On the Isle of May (**south-east Scotland**), breeding success was the third lowest recorded since monitoring began with losses occurring at the egg and chick stages found to be higher than normal (Wilson 2002). At Sumburgh Head (**Shetland**) productivity was slightly below that in 2001 (itself a lowish figure), and attendance of chicks by adults was noted to be very low (Heubeck 2003), suggesting that parents had to forage for longer or from more distant areas. Furthermore, chick weights in 2002 were markedly lower than a sample taken in 1999, for chicks of similar age, suggesting that their weight at fledging would be low (Heubeck 2003).

### 3.24 Razorbill *Alca torda*

*Between 2001 and 2002, changes in the number of birds in sample plots were non-significant in all regions, with minimal decreases noted in northern regions compared with slight increases in southern regions. Whole-colony counts revealed larger proportional changes; the number of razorbill sites increased in south-east Scotland and north-east England, but a large decrease was evident in the number of birds on the Isle of May (also south-east Scotland). At six colonies where breeding success was monitored in 2001 and 2002, productivity decreased at four and increased at two. Mean productivity, at 0.64 chicks fledged per pair, was less than in 2001 and below the long-term mean.*

*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 2001 and 2002. 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, due to

their habit of often nesting in crevices and under boulders, and that consequently there may be considerable variation in counts between individual observers.

**Table 3.24.1** Population changes at monitored razorbill colonies, 2001-2002 (adults attending colony in first three weeks of June unless otherwise indicated). Regional totals of fewer than 50 birds are excluded. Trends for 1986-2001 are average annual rates of change shown by sample populations. Significance of trends is indicated as: n.s. \*  $P < 0.05$ , \*\*\*  $P < 0.001$ . 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 replicate counts of each of the study plots.

Region	2001	2002	2001-2002 % change	% annual change
NW Scotland <sup>a</sup>	596	567	-4.9	-
Shetland <sup>b</sup>	513	480	-6.4	+1.7* 1986-2001
SE Scotland <sup>c</sup>	160	170	+6.2	+4.5*** 1986-2001
Wales <sup>d</sup>	2,512	2,514	+0.1	+3.8*** 1986-2001

Colonies: <sup>a</sup> Handa; <sup>b</sup> Hermaness, Eshaness, Burravoe, Noss, Troswick Ness, Sumburgh Head, Fair Isle; <sup>c</sup> St Abb's Head; <sup>d</sup> 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	2001	2002	2001-2002 % change	% annual change
SE Scotland (birds) <sup>a</sup>	4,114	3,050	-25.9	+6.0*** 1986-2001
SE Scotland (sites) <sup>b</sup>	529	610	+15.3	-
NE England (sites) <sup>c</sup>	173	209	+20.8	-
Wales <sup>d</sup>	7,011	7,087	+1.1	+2.6*** 1986-2001

Colonies: <sup>a</sup> Isle of May; <sup>b</sup> Inchkeith, Craigleith, Fidra, The Lamb, Bass Rock; <sup>c</sup> Farne Islands; <sup>d</sup> Stackpole Head NNR, Elegug Stacks plus nearby coast, Skokholm, Skomer.

In **Shetland**, numbers of birds in study plots decreased compared with 2001, with non-significant decreases occurring in plots at Eshaness, Noss and Sumburgh Head, and non-significant increases recorded in plots at Hermaness, Troswick Ness, Burravoe and Fair Isle. The regional population index has generally shown an increasing trend since 1990, with low values in 1998, 2001 and 2002 attributed to low colony attendance of adults rather than genuine decreases. At North Hill, Papa Westray (**Orkney**), the number of birds in study plots increased by 20.4% from 54 to 65 individuals since 1999, although this too was a non-significant change.

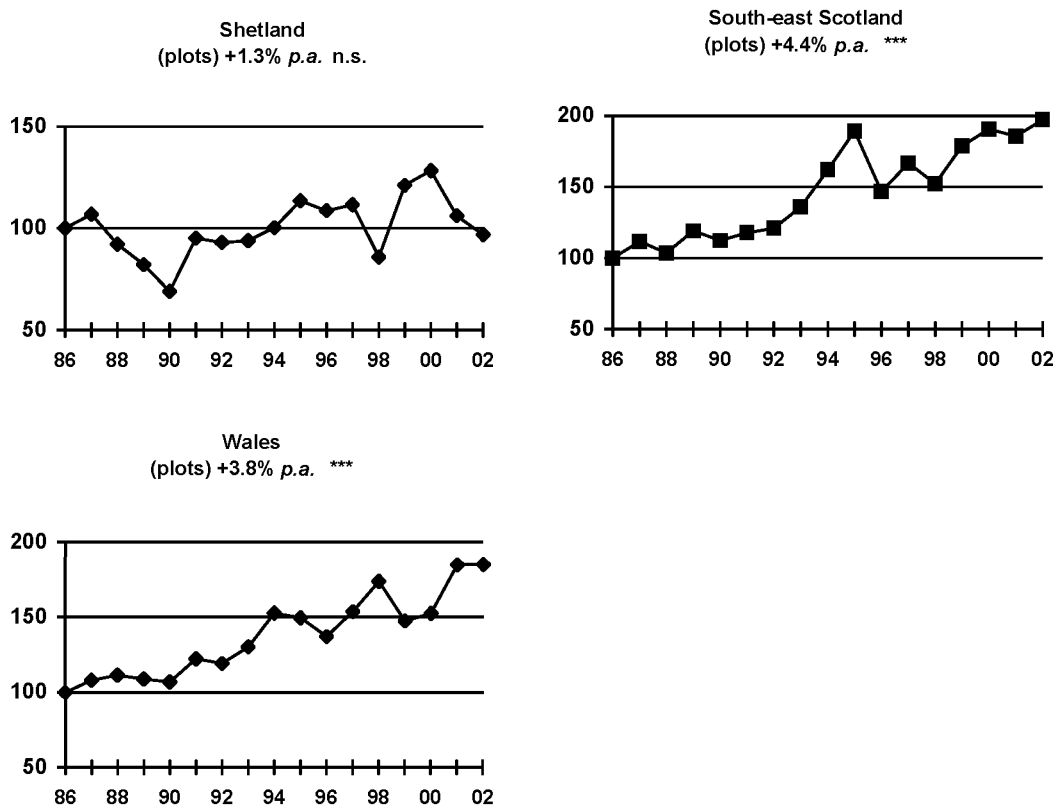
In **south-east Scotland**, the trend has been for a general increase in population index value (with occasional dips) since monitoring began. In 2002, a non-significant increase was recorded in plots at St Abb's Head since 2001. Changes in whole-colony counts, carried out at the Isle of May, the Bass Rock and at several islands in the Firth of Forth (Inchkeith, Craigleith, Fidra and Lamb), were generally larger. At the first site, numbers decreased by 25.9% since 2001 to of 3,050 birds, the lowest count recorded there (Moeller-Holtkamp 2002). At the latter two sites, numbers increased since 2001, with the count from the Bass Rock being the highest figure recorded there (Jones 2002). In **north-east England**, the population on the Farne Islands increased by 20.8% to 209 individuals, the highest count since 1995.

**Table 3.24.2** Population changes of razorbills 2001-2002 and 1986-2001 at selected sites referred to in the text. P\W indicates plot or whole-colony counts.

Region/Site		2001	2002	% change 2001-2002	1986-2001	
					Mean ( $\pm$ s.d)	No. years
<b>SW Scotland</b>						
Lunga	W	980	1,138	+16.2	948 (339)	9
<b>NW Scotland</b>						
Handa	P	596	567	-4.9	526 (53.2)	4
<b>Shetland</b>						
Noss	P	94	86	-8.5	70 (14.2)	14
Hermaness	P	48	59	+22.9	61 (15.7)	14
Eshaness	P	68	54	-20.3	52 (16.8)	16
Troswick Ness	P	11	18	+63.6	18 (4.4)	16
Sumburgh Head	P	219	182	-16.9	216 (34.0)	16
Burravoe	P	11	13	+18.2	12 (4.0)	11
Fair Isle	P	62	68	+9.7	67 (4.5)	3
<b>SE Scotland</b>						
Forth Islands	W	392	417	+6.4	324 (81.8)	6
Isle of May	W	4,114	3,050	-25.9	2,999 (870)	16
Bass Rock	W	137	193	+40.9	133 (61.5)	6
St Abb's Head	P	160	170	+6.2	168 (22.0)	13
<b>NE England</b>						
Farne Islands	W	173	209	+20.8	165 (25.7)	7
<b>Wales</b>						
Elegug Stacks	P	375	345	-8.0	291 (76.7)	14
	W	685	614	-10.4	596 (122)	9
Stackpole Head	P	71	62	-12.7	68 (9.8)	6
Skokholm	P	178	192	+7.9	135 (24.0)	8
	W	1,218	1,011	-17.0	991 (184)	10
Skomer	P	1,184	1,224	+3.4	786 (184)	15
	W	4,772	5,095	+6.8	3,210 (514)	16
South Stack	P	704	691	-1.8	500 (83.6)	16

In **Wales**, where the population index has also shown a general increase since 1986, there was little overall change in the number of birds at study plots between 2001 and 2002. Considering individual colonies, decreases were noted at Elegug Stacks, Stackpole Head and South Stack with increases recorded at Skokholm and Skomer, although all changes were non-significant. Whole-colony counts revealed declines at Elegug Stacks and Skokholm, with 1,011 birds at the latter site being the lowest figure recorded there since 1988. However, razorbill numbers on Skomer reached a new high (Brown and Duffield 2002).

In **north-west England**, a slight increase of 4.8% was recorded at St Bee's Head since 2000 although the count of 263 birds was the highest at this site since 1992.



**Figure 3.24.1** Regional population indices for breeding razorbills in various regions, 1986-2002 (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: \*  $P < 0.05$ , \*\*  $P < 0.01$ , \*\*\*  $P < 0.001$ .

In **north-west Scotland**, a non-significant decrease occurred in study plots on Handa between 2001 and 2002 (Stoneman and Williams 2002). Whole-colony counts in **south-west Scotland** revealed an increase on Lunga (Treshnish Isles) over the same period (Ward 2002), and at the Mull of Galloway numbers increased by 81.4% from 328 to 595 birds since 2000.

In **north-east Ireland**, 746 birds were counted on the Isle of Muck, which represented an increase of 113.8% since 2000. This is the highest figure recorded at this site, when the previous peak count was of 447 birds in 1995.

#### *Breeding success* (Table 3.24.3)

It should be noted that the intensity of monitoring at the colonies listed in Table 3.24.2 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.

Of six colonies monitored in 2002, breeding success had decreased at four and increased at two since 2001. Mean productivity was 0.64 (s.e.  $\pm 0.08$ ) chicks fledged per breeding pair, less than that recorded from the same six colonies in 2001 (0.70, s.e.  $\pm 0.06$ ) and also lower than the long-term mean of 0.69 (s.e.  $\pm 0.01$ ) recorded from between one and six colonies monitored annually during 1986-2001.

The most successful colony in 2002 was North Sutor (**north Scotland**), where breeding success was close to the highest figure recorded at this site and consequently above the long-term average for the colony (Swann 2002b). Productivity at the Isle of May (**south-east Scotland**), although higher than in 2001, remained below the colony average; most losses occurred at the egg stage with chick survival to fledging noted as being particularly high at 94% (Wilson 2002).

**Table 3.24.3** Razorbill breeding success, 2001-2002 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 1986-2001			2001 chicks fledged/pair			2002 chicks fledged/pair			2001-2002 change	
	Years	Mean	±s.e.	Sites <sup>n</sup>	Mean	±s.e.	Sites <sup>n</sup>	Mean	±s.e.	Mean	±s.e.
Fair Isle	11	0.62	±0.03	93 <sup>1</sup>	0.65	-	90 <sup>1</sup>	0.63	-	-0.02	-
North Sutor	5	0.74	±0.05	15 <sup>1</sup>	0.60	-	15 <sup>1</sup>	0.87	-	+0.13	-
Isle of May	16	0.68	±0.02	167 <sup>4</sup>	0.60	±0.09	167 <sup>4</sup>	0.65	±0.08	+0.05	-
Farnes	6	0.72	±0.06	14 <sup>1</sup>	0.93	-	21 <sup>1</sup>	0.52	-	-0.41	-
Skokholm	6	0.85	±0.03	87 <sup>1</sup>	0.87	-	89 <sup>1</sup>	0.80	-	-0.07	-
Skomer	9	0.61	±0.03	299 <sup>5</sup>	0.58	±0.05	297 <sup>5</sup>	0.36	±0.07	-0.22	-
<b>Total<sup>no.</sup> colonies</b>	-	-	-	675 <sup>6</sup>	<b>0.70</b>	±0.06	679 <sup>6</sup>	<b>0.64</b>	±0.08	<b>-0.09<sup>6</sup></b>	±0.08

Of the four colonies where breeding success decreased between 2001 and 2002, the least successful was Skomer (**Wales**), where productivity was the lowest on record although the reasons for the low value are not clear (Brown and Duffield 2002). Elsewhere in this region, breeding success at Skokholm, although lower than that recorded in 2001, was still reasonably high and close to the long-term mean for the colony. Low breeding success was also observed at the Farne Islands (**north-east England**), where productivity had been the highest on record in 2001, but was now at its lowest in 2002. In **Shetland**, breeding success declined only slightly on Fair Isle between 2001 and 2002 and was close to the long-term mean for the colony.

### 3.25 Black guillemot *Cepphus grylle*

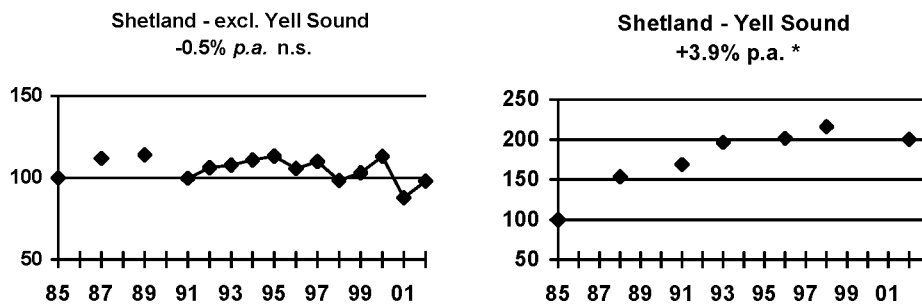
*Survey work in Yell Sound (Shetland), found that the population has increased since 1985 but has probably been relatively stable since 1993. Elsewhere in Shetland, despite some fluctuations, numbers have been relatively stable over that period. At the Monach Isles (north-west Scotland), numbers also appear to have been stable since 1988. In contrast, the populations of Fair Isle and Orkney appear to be undergoing significant long-term declines, although an increase was noted in Orkney between 2001 and 2002. Productivity data from four sites suggest it was an average breeding season.*

*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**, a re-count of Yell Sound in the spring of 2002 found a total of 1,311 birds, representing a 7.4% decrease since 1998 (*cf* 1,416 birds). It is now believed that the apparent decline recorded in 2001 (a decrease of 28.5% to 1,013 birds since 1998) was probably an aberration due to low tides during the survey period, with birds choosing to feed offshore rather than attend colonies on those

days (Heubeck 2003). Since 1993 the Yell Sound population has been stable at around 1,300-1,400 birds. Elsewhere in the region, an overall decrease of 13.3% was noted between 2000 and 2002 (few colonies were surveyed in 2001 due to foot and mouth disease access restrictions). At three colonies that were counted in 2001 and 2002, increases were noted in study areas on Noss (+25.4% to 79 birds) and Foula (+17.2% to 136 birds) with a decrease recorded on Fair Isle (-10.8% to 124 birds). Annual rates of change suggest that the black guillemot population has increased significantly since 1985 in Yell Sound, while numbers have remained stable around the rest of Shetland over the same period.



**Figure 3.25.1** Regional population indices for breeding black guillemots in Shetland, 1985-2002. Based on counts of adults in breeding habitat late March-early May. Average annual rates of change were calculated by regression of natural log of index against year (see section 1.2.2. for details). Statistical significance of trends indicated as: n.s., not significant; \*  $P < 0.05$ .

In **Orkney**, numbers increased by 6.6% at three colonies monitored in 2001 and 2002. Of particular note was an increase on North Ronaldsay of 24.8%, from 400 to 499 birds, the highest figure ever counted there. However, on Papa Westray, after the large increase recorded at North Hill between 2000 and 2001, numbers declined by 37.9% to 128 birds (Meek 2002). The annual rate of change for Orkney colonies suggests there has been a significant decline in numbers since 1983.

**Table 3.25.1** Population changes at monitored black guillemot colonies, 2001-2002, with additional 2000 data for those colonies that could not be visited in 2001. 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, \*  $P < 0.05$ , \*  $P < 0.01$ , \*\*\*  $P < 0.001$ . For further details of the calculation of these trends see section 1.2.2.

Region/site	2000	2001	2002	2001-2002 % change	% annual change
<b>Shetland</b>					
Yell Sound (see text)	-	(1,013)	1,311	(+29.4)	+5.5** 1985-1998
Other Shetland <sup>a</sup>	1,833	-	1,590	-	-0.4 n.s. 1985-2001
<b>Orkney</b> <sup>b</sup>	736	712	755	+6.0	-4.4*** 1983-2001

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

In **north-west Scotland**, a re-count of the Monach Isles totalled 819 individuals (A. Stevenson, pers. comm.), suggesting that the 2001 survey which recorded 585 birds had been an underestimate as originally thought (Mavor *et al.* 2001). Thus, numbers have been relatively stable since 1988, when 849 individuals were recorded at this site. Elsewhere, the black guillemot population of Eigg increased from 220 to 242 birds. At the Mull of Galloway (**south-west Scotland**), 46 birds were counted compared to 37 birds in 1999.

*Breeding success* (Table 3.25.2)

Few data were collected in 2001. In **Orkney**, the average clutch/brood size of 36 nests checked on Auskerry in mid July was below average at 1.21. Data was also received from Swona for the second successive year, where productivity from eight nests was 1.75 chicks fledged per nest. In a study area stretching from Mallaig to Tarbert (**north-west** and **south-west Scotland**), of 29 sites checked which held a total of c.100-110 breeding adults, mink were found to be active at four sites. At two of these sites, four former black guillemot nest crevices were now mink dens (Craik 2002). Breeding success was high on Old Lighthouse Island (**north-east Ireland**), where 1.41 chicks fledged per nest (n=17); the highest figure recorded there. In **south-east Ireland**, breeding success on Rockabill was close to the long-term average.

**Table 3.25.2** Breeding success of black guillemots, 2001-2002 and 1986-201. Figures are the number of chicks fledged per active site where an egg or apparent incubation has been recorded. Figures in parentheses are the number of active sites from which the breeding success estimates were derived.

Region/site	2001	2002	1986-2001 mean	
			Mean ( $\pm$ s.e.)	No. of years
<b>Orkney</b>				
Swona	1.67 (6)	1.75 (8)	-	-
Auskerry	1.66 (35)	1.21 (36)	1.35 (0.08)	7
<b>NE Ireland</b>				
Old Lighthouse Island	1.14 (21)	1.41 (17)	0.98 (0.08)	12
<b>SE Ireland</b>				
Rockabill	1.11 (38)	1.17 (35)	1.16 (0.05)	4

### 3.26 Atlantic puffin *Fratercula arctica*

*Surveys of several large colonies were undertaken in 2002. Numbers declined at Hermaness (Shetland), increased on Coquet (north-east England) and remained stable on North Rona (north-west Scotland) and Lunga (south-west Scotland). Successful breeding was confirmed on Ailsa Craig for the first time in decades following the eradication of rats there in the early 1990s. Productivity data suggest that overall 2002 was an average breeding season, although breeding performance decreased at three colonies compared with 2001.*

#### *Breeding numbers*

Relatively little information was collected on Atlantic puffin numbers in 2002. At Hermaness (**Shetland**), a series of permanent monitoring transects was surveyed for the first time in five years. The number of occupied burrows was found to be marginally higher than during the mid-90s but still low compared with the previous two decades. This suggests that the decline of the colony may have stopped although data from subsequent years will verify if this apparent trend is real or simply an artefact of sampling error (Martin 2002). An estimate was also made of the total number of occupied burrows in the colony. This was based on dusk counts of loafing adults throughout the colony with simultaneous counts of adults in a sample plot holding a known number of occupied burrows, from which time-specific correction factors were obtained. From these data it was estimated that the colony numbered 23,661 breeding pairs, some 16% lower than the previous best estimate, in 1997. However, given the uncertain biases introduced by the count method used, this result should not be taken as being necessarily indicative of any real change in numbers over this period (Martin 2002).

On North Rona (**north-west Scotland**), a complete survey found a total of 5,265 AOB, including an estimated 655 pairs situated in areas of boulder scree (Murray *et al.* 2003). In all, 31 sub-colonies were identified, with the largest on the Toa North Rona cliffs holding a minimum of 3,276 AOB, c.



62% of the island total. However, within this sub-colony, in the area from Sròn na Caorach to Leac Iain Tailllear, steep cliffs together with unstable terrain and thick vegetation hampered accurate counting of burrows. As a result, the total of 1,054 AOB in this area is viewed as a minimum figure which could be as much as 50% higher (S. Murray, in prep.). Seven of the 31 sub-colonies were located in boulder fields that made burrow counts impossible. These were estimated by counting individual birds ashore two hours before sunset over several evenings. Only two boulder field colonies, in Geodha Lèis and Geodha Mairi, held 200+ pairs with the remaining five together holding fewer than 200 pairs. Comparisons with 1993 counts (when the colony was estimated to hold 4,000-7,000 pairs), sample densities and sub-colony locations indicate no change in overall numbers or distribution of burrows since then (S. Murray, in prep.).

On Lunga in the Treshnish Isles (**south-west Scotland**), 1,793 AOB plus 343 individuals were counted (Ward 2002). Combining units, allowing for 1-2 birds per 'pair' (Lloyd *et al.* 1991), would indicate a population of 2,136-3,929 individuals for this island, similar to the figures reported in 2001 (2,146-3,688 individuals). On Ailsa Craig, a peak count of 21 individuals was noted on the island during July. Subsequently, two adults were seen carrying fish ashore in early August indicating successful breeding (Zonfrillo 2002). This is the first time that breeding has been confirmed on the island since the successful rat eradication programme carried out in the early 1990s. On Handa (**north-west Scotland**), the peak spring count totalled 584 individuals. There was no further increase in the area that had been recolonised after successful rat eradication (Stoneman and Williams 2002).

On Coquet Island, **north-east England**, 18,729 AOB represented a 8.8% increase on 2001 figures (17,208 AOB) which in turn was noted as a 50.2% increase since the previous survey in 1998 (P. Morrison, pers. comm.). In **Wales**, the peak spring count on Skomer totalled 10,338 birds (1989-2001 mean, 9,350, s.d.  $\pm$  992) (Brown and Duffield 2002).

#### *Breeding success* (Table 3.26.1)

Productivity data suggests that Atlantic puffins had a reasonable breeding season overall in 2002, although breeding performance at three colonies decreased compared to 2001. In **Shetland**, productivity on Fair Isle was the highest recorded since 1997 and above the long-term average (0.69, s.e.  $\pm$  0.04). However, the figure is thought to be a slight overestimate as delayed access to the monitoring site meant that early failures would have been missed (Shaw *et al.* 2002). On the Isle of May (**south-east Scotland**), breeding success was slightly lower than in 2001 when it had been close to the long-term average (0.76, s.e.  $\pm$  0.03) (Wilson *et al.* 2002).

Productivity on the Farnes (**north-east England**) in 2002 was at its lowest value since 1999 and below the average of 0.73 (s.e.  $\pm$  0.06) measured over 1994-2001. High rainfall in all months during the breeding season flooded many burrows, especially in the Outer Group of islands (Brownsman and Staple) where only 18 chicks fledged from 50 monitored burrows compared to 47 chicks fledging from 50 burrows on Inner Farne (Walton 2002).

In **Wales**, breeding success on Skomer averaged 0.69 chicks fledged per occupied burrow – marginally less than that in 2001 and below the long-term mean (0.77, s.e.  $\pm$  0.02) for the fourth year in succession (Perrins 2003).

**Table 3.26.1** Atlantic puffin breeding success, 2001-2002. Estimated number of chicks fledged per egg or occupied burrow (Welsh colonies). Superscript indicates number of colonies.

Colony	2001 chicks fledged/pair				2002 chicks fledged/pair				2001-2002 change	
	Burrow s	Range	Mean	$\pm$ s.e.	Burrow s	Range	Mean	$\pm$ s.e.	Mean	$\pm$ s.e.
Fair Isle	87	-	0.31	-	62	-	0.74	-	+0.43	-
Isle of May	185	-	0.77	-	174	-	0.72	-	-0.05	-
Farne Islands	100	-	0.85	-	100	-	0.65	-	-0.20	-
Skomer	90	-	0.71	-	78	-	0.69	-	-0.02	-
<b>Total</b>	462 <sup>4</sup>	0.31-0.85	<b>0.66</b>	0.12	414 <sup>4</sup>	0.65-0.74	<b>0.70</b>	0.02	<b>+0.04<sup>4</sup></b>	$\pm$ 0.14

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