

APPENDIX 5 – COASTAL AND SEABIRDS OF THE SEA 5 AREA

Data sources

In 2004 the results of the Seabird 2000 Census (1998-2002) was published. The project, which censused all 25 seabird species which regularly breed in Britain and Ireland, was a partnership between the Joint Nature Conservation Committee, the UK Government's adviser on nature conservation and other British and Irish Government agencies and non-government organisations: the Royal Society for the Protection of Birds; Scottish Natural Heritage; English Nature; the Countryside Council for Wales; the Environment and Heritage Service; the Seabird Group; Shetland Oil Terminal Environmental Advisory Group; Birdwatch Ireland and the National Parks and Wildlife Service.

Field work for the census began in 1998 and was completed in 2002 and the census was the third complete seabird census to be conducted in Britain and Ireland. The first census, Operation Seafarer was conducted in 1969-1970, by the Seabird Group and the results were summarised in Cramp *et al* (1974) *The seabirds of Britain and Ireland*. The second census was instigated by the then Nature Conservancy Council and the Seabird Group as part of the establishment of the Seabird Colony Register (SCR). The results of the second census were summarised in Lloyd *et al* (1991) *The status of seabirds in Britain and Ireland*. The establishment of the SCR also led to the creation of the Seabird Monitoring Programme (SMP), which is coordinated by the JNCC's Seabird Colony Team and involves regular monitoring of seabird demographics including population size and breeding success at various colonies throughout Britain and Ireland.

The Seabirds at Sea Team (SAST) of the JNCC has been studying the distribution and abundance of seabirds and marine mammals in the waters around Britain since 1979. These surveys have continued in British and Irish waters, and along with similar data collected by other European countries, have been incorporated into the European Seabirds at Sea (ESAS) database, which now contains over 1.5 million seabird records. Since 2000, SAST's main obligations have been to perform novel analyses to existing and new data sources to provide guidance for the identification of sites and boundaries for marine Special Protection Areas (SPAs).

During the winters of 2000/01 and 2001/02, the JNCC SAST conducted aerial surveys of wintering aggregations of seaduck, divers and grebes, the aim of which was to collect data on non-breeding numbers and distributions of these species, within UK inshore areas of known importance.

A review of thirteen species of diver, grebe and seaduck distribution and abundance in the SEA 5 area was also conducted and published by Cork Ecology as an underpinning report for the SEA 5 Assessment. Cork Ecology also published a review of the potential impacts of offshore wind farms on migrating and over wintering swans and geese in the SEA 5 area.

The scheme which monitors non breeding waterbirds in the UK is the Wetland Bird Survey (WeBS), which publishes an annual report, *Wildfowl and wader counts* and the principal aims of which are to identify population sizes, determine trends in numbers and distribution and to identify important sites for waterbirds. WeBS is jointly run by the British Trust for Ornithology, The Wildfowl and Wetlands Trust, the Royal Society for the Protection of Birds and the JNCC.

Species and geographical descriptions

The following sections will provide descriptions of species, including important breeding, wintering and migratory areas and numbers for seabirds, waterbirds and any other birds of conservation value which are likely to utilise the coastal fringes and offshore areas of SEA 5.

Seabirds

The Taxonomic Families of seabird which regularly breed in Britain and which will be included in this assessment are described in Table A5.1.

Table A5.1 - Seabird species regularly breeding in Britain

Taxonomic Families	Species
Procellariidae	Four species of petrel (fulmar (<i>Fulmarus glacialis</i>), Manx shearwater (<i>Puffinus puffinus</i>), storm petrel (<i>Hydrobates pelagicus</i>), Leach's petrel (<i>Oceanodroma leucorhoa</i>))
Phalacrocoracidae	Two species of cormorant (cormorant (<i>Phalacrocorax carbo</i>), shag (<i>Phalacrocorax aristotelis</i>))
Sulidae	One species (gannet (<i>Morus bassanus</i>))
Stercorariidae	Two species of skua (great skua (<i>Stercorarius skua</i>), Arctic skua (<i>Stercorarius parasiticus</i>))
Laridae	Six species of gull (herring gull (<i>Larus argentatus</i>), common gull (<i>Larus canus</i>), black-headed gull (<i>Larus ridibundus</i>), lesser black-backed gull (<i>Larus fuscus</i>), great black-backed gull (<i>Larus marinus</i>), kittiwake (<i>Larus tridactyla</i>))
Sternidae	Five species of tern (sandwich tern (<i>Sterna sandvicensis</i>), Roseate tern (<i>Sterna dougallii</i>), common tern (<i>Sterna hirundo</i>), Arctic tern (<i>Sterna paradisaea</i>), little tern (<i>Sterna albifrons</i>))
Alcidae	Four species of auk (guillemot (<i>Uria aalge</i>), razorbill (<i>Alca torda</i>), black guillemot (<i>Cephus grylle</i>), puffin (<i>Fratercula arctica</i>))

Source: Lloyd et al. 1991

Amongst the most noteworthy areas for large assemblages of breeding seabirds in the SEA 5 region are the East Caithness Cliffs, Troup, Pennan and Lion's Head, the coast from Buchan Ness to Collieston Coast, Fowlesheugh and the Firth of Forth Islands all of which support seabird assemblages of international importance (Figure A5.3). Of these areas, the East Caithness Cliffs support the greatest assemblage during the breeding season, estimated at around 300,000 individual seabirds, while Fowlsheugh supports in the region of 170,000 individual seabirds, Troup, Pennan and Lion's Head supports around 150,000 individual seabirds and the Firth of Forth Islands support in the region of approximately 90,000 individual seabirds (JNCC website).

In areas dominated by cliffs, seabird colonies can be more or less contiguous with boundaries between them imprecise, making evaluation difficult (Tasker 1997). Several colonies in the SEA 5 area have been designated Special Protection Areas (SPAs) (Table A5.2) and are strictly protected sites classified in accordance with Article 4 of the EC Directive on the conservation of wild birds (79/409/EEC).

Table A5.2 - Important seabird colonies in the SEA 5 area with protected status.

Colony	Species	Colony	Species
Hermaness, Saxa Vord & Valla Field ¹	Gannet, great skua, puffin	Marwick Head ¹	Gillemot
Fetlar ¹	Arctic tern, great skua	West Westray ¹	Arctic tern, guillemot
Noss ¹	Gannet, great skua, guillemot	Pentland Firth Islands	Arctic tern
Mousa	Arctic tern, storm petrel	East Caithness Cliffs ¹	Guillemot, herring gull, Kittiwake, razorbill, shag
Sumburgh Head ¹	Arctic tern	Cromarty Firth	Common tern
Fair Isle ¹	Arctic tern, guillemot	Inner Moray Firth	Common tern
Foula ¹	Arctic tern, leach's petrel, great skua, guillemot, puffin, shag	Troup, Pennan & Lion's Heads ¹	Guillemot
Papa Stour	Arctic tern	Buchan Ness to Collieston Coast ¹	Guillemot, herring gull, shag, kittiwake, fulmar
Ramna Stacks & Gruney	Leach's petrel	Ythan Estuary, Sands of Forvie & Meikle Loch	Common tern, little tern, sandwich tern
Papa Westray (North Hill & Holm)	Arctic tern, Arctic skua	Fowlsheugh ¹	Guillemot, kittiwake
Calf of Eday ¹	-	Firth of Tay & Eden Estuary	Little tern
Auskerry	Arctic tern, storm petrel	Firth of Forth Islands ¹	Arctic tern, common tern, Roseate tern, sandwich tern
Copinsay ¹	-	Firth of Forth	Sandwich tern
Hoy ¹	Great skua	St. Abb's Head to Fast Castle ¹	Razorbill, guillemot, kittiwake, herring gull, shag

Source: JNCC website

Notes: ¹Also denotes sites with seabird assemblages of international importance - qualifying level: regularly supporting at least 20,000 seabirds.

There are currently no offshore Special Protection Areas in the SEA 5 area.

Mitchell *et al.* (2004) describes the population size of different species in each administrative area within Great Britain. These administrative areas are no longer used by local and national governments within the UK and were replaced in 1996. Details of these administrative areas can be found in Mitchell *et al.* (2004) (Figure 4). The following tables (Table A5.3a, A5.3b, A5.3c and A5.3d) describe the most recent data on breeding seabirds from administrative areas within SEA 5. All figures represent coastal breeding birds unless otherwise stated.

Table A5.3a - Breeding seabird numbers from administrative areas in SEA 5: the Northern Isles.

Species	Number of breeding birds (Seabird 2000 count (1998-2002))	Species	Number of breeding birds (Seabird 2000 count (1998-2002)) ¹
Shetland			
Common gull	2,424 (AON)	Fulmar	188,544 (AOS)
Lesser black-backed gull	341 (AON)	Manx shearwater	7 (AOS)
Herring gull	4,027 (AON)	Storm petrel	7,502 (AOS)
Great black-backed gull	2,875 (AON)	Leach's storm petrel	35 (AOS)
Kittiwake	16,732 (AON)	Gannet	26,249 (AOS/AON)
Common tern	104 (AON)	Cormorant	192 (AON)
Arctic tern	24,716 (AON)	Shag	6,147 (AON)
Guillemot	172,681 (I)	Arctic skuas	1,120 (AOT)
Razorbills	9,492 (I)	Great skua	6,846 (AOT)
Puffin	107,676 (AOB)	Black-headed gull	586 (AON)
Orkney			
Herring gull	1,933 (AON)	Fulmar	90,846 (AOS)
Great black-backed gull	5,505 (AON)	Storm petrel	1,870 (AOS)
Kittiwake	57,668 (AON)	Cormorant	412 (AON)
Sandwich tern	173 (AON)	Shag	1,872 (AON)
Common tern	125 (AON)	Arctic skua	720 (AOT)
Arctic tern	13,476 (AON)	Great Skua	2,209 (AOT)
Little tern	4 (AON)	Black-headed gull	2,854 (AON)
Guillemot	181,026 (I)	Common gull	11,141 (AON)
Razorbills	10,194 (I)	Lesser black-backed gull	1,045 (AON)
Puffins	61,758 (AOB)		

Notes: ¹ Surveys for storm and leach's petrel were between 1999-2002.

AON = Apparently Occupied Nests; AOS = Apparently Occupied Sites; AOT = Apparently Occupied Territories; AOB = Apparently Occupied Burrows; I = Individual birds.

Large numbers of kittiwake, guillemot, puffin and fulmar are found in Shetland and Orkney (Table A5.3a). Both Arctic and great skua nest on the island groups and both are confined, as a breeding species, to these islands, sites in north and west Caithness and a few sites on the islands west of Scotland (Gibbons *et al.* 1994). The Seabird 2000 survey, which represents the first comprehensive survey of storm petrels in Britain and Ireland, found the largest colony of this species on Mousa, which held 6,800 AOS, while the largest colonies in Orkney were found on Auskerry (994 AOS). The guillemot colony on Noss is one of the top five sites with 45,777 individuals recorded, while on Fair Isle approximately 40,000 individuals were recorded (Mitchell *et al.* 2004).

At Hermaness and Noss the number of gannets recorded were 16,386 AOS/AON and 8,017 AOS/AON respectively, with a further 1,123 AOS/AON on Fair Isle. One of the largest colonies for kittiwake in Scotland, is on Copinsay (Orkney) and although numbers have decreased by 54% between the Seabird Colony Register (SCR) census (1985-1988) and the Seabird 2000 (1998-2002) survey, there were some 9,550 AON on the island (Mitchell *et al.* 2004).

Table A5.3b - Breeding seabird numbers from administrative areas in SEA 5: northeast coast of Scotland

Species	Number of breeding birds (Seabird 2000 count (1998-2002))	Species	Number of breeding birds (Seabird 2000 count (1998-2002))
East coast Caithness			
Fulmar	20,269 (AOS)	Great black-backed gull	181 (AON)
Cormorant	107 (AON)	Kittiwake	43,839 (AON)
Shag	1,075 (AON)	Little tern	14 (AON)
Black-headed gull	27 (AON)	Guillemot	195,295 (I)
Common gull	15 (AON)	Razorbill	19,161 (I)
Herring gull	3,503 (AON)	Puffin	497 (AOB)
Inverness			
Common gull	135 (AON)	Great black-backed gull	5 (AON)
Lesser black-backed gull	6 (AON)	Common tern	10 (AON)
Herring gull	356 (AON)	Arctic tern	25 (AON)
Nairn			
Black-headed gulls	300 (AON)	Herring gull	80 (AON)
Moray			
Fulmar	569 (AOS)	Kittiwake	488 (AON)
Shag	33 (AON)	Common tern	24 (AON)
Herring gull	581 (AON)	Arctic tern	244 (AON)
Great black-backed gull	10 ¹ (AON)	Little tern	2 (AON)
Banff and Buchan (including Troup Head)			
Fulmar	5,146 (AOS)	Great black-backed gull	37 (AON)
Northern gannet	1,085 AOS/AON)	Kittiwake	30,599 (AON)
Cormorant	9 (AON)	Common tern	202 (AON)
Shag	656 (AON)	Arctic tern	184 (AON)
Black-headed gull	430 (AON)	Guillemot	73,970 (I)
Lesser black-backed gull	10 (AON)	Razorbill	7,606 (I)
Herring gull	6,671 (AON)	Puffin	1,026 (AOB)
Gordon			
Fulmar	1,017 (AOS)	Kittiwake	3,560 (AON)
Cormorant	48 (AON)	Sandwich tern	524 (AON)
Shag	25 (AON)	Gordon	31 (AON)
Black-headed gull	194 (AON)	Arctic tern	76 (AON)
Lesser black-backed gull	6 (AON)	Little tern	58 (AON)
Herring gull	853 (AON)	Guillemot	3,345 (I)
Great black-backed gull	5 (AON)	Razorbill	574 (I)
		Puffin	619 (AOB)
City of Aberdeen			
Fulmar	225 (AOS)	Great black-backed gull	9 (AON)
Shag	3 (AON)	Kittiwake	1,695 (AON)
Black-headed gull	68 (AON)	Common tern	68 (AON)
Common gull	280 (AON)	Guillemot	395 (I)
Lesser black-backed gull	154 (AON)	Razorbill	157 (I)
Herring gull	3,522 (AON)	Puffin	75 (AOB)

Notes: AON = Apparently Occupied Nests; AOS = Apparently Occupied Sites; AOT = Apparently Occupied Territories; AOB = Apparently Occupied Burrows; I = Individual birds.

The north and east coast of Scotland supports large numbers of fulmar, kittiwake, guillemot and razorbill (Table A5.3b). One of the largest colonies of guillemot is found on the mainland cliffs at Berriedale (east coast Caithness) with 79,071 individuals. These cliffs also support one of the largest colonies of razorbill in Scotland, with 6,630 individuals and is a major colony for kittiwakes supporting 24,427 AON. The numbers of kittiwakes around the Moray Firth area was found to have increased by: 12% along the east Caithness coast; 128% at the North and South Sutor colonies and 96% in Moray (Mitchell *et al.* 2004).

The Moray Firth and surrounding coastline is of year round importance for birds and much of it is colonised by seabirds. Breeding seabirds including kittiwake, guillemot and razorbill at colonies along the coastline such as those at Caithness cliffs, commute offshore to feed, particularly over the Smith Bank, while cormorants, shags, gulls and terns tend to feed closer to shore. The waters of the outer Moray Firth and the nearshore waters off the Moray coast are of particularly importance as feeding areas (Tasker 1996). After breeding, adult and juvenile auks move offshore where the adults moult. The waters around the Smith Bank also support the largest year round concentration of shags in British waters while coasts along the southern Moray Firth are of particular year round importance for herring gulls. Aberdeen city supports the fifth largest colony of herring gulls (3,350 AON) in Britain and Ireland and supports the largest urban herring gull colony in the world (Mitchell *et al.* 2004).

Along the east coast of Scotland, practically all of the major colonies between Banff and Buchan and East Lothian recorded a decrease in herring gull numbers, including almost the total extirpation of the colony at St. Cyrus. Other notable declines of herring gull numbers between the SCR Census and Seabird 2000 occurred at Tremuda Bay to Old Hall Bay (decline of 91% to 112 AON), Meg's Craig to Deils Heid North (decline of 87% to 127 AON) and Sands of Forvie (decline of 74% to 272 AON) (Mitchell *et al.* 2004)

Table A5.3c - Breeding seabird numbers from administrative areas in SEA 5: East coast of Scotland

Species	Number of breeding birds (Seabird 2000 count (1998-2002))	Species	Number of breeding birds (Seabird 2000 count (1998-2002))
Kincardine and Deeside			
Fulmar	3,135 (AOS)	Great black-backed gull	21 (AON)
Cormorant	88 (AON)	Kittiwakes	34,501 (AON)
Shag	13 (AON)	Common tern	13 (AON)
Common gull	22 (AON)	Guillemot	72,179 (I)
Lesser black-backed gull	8 (AON)	Razorbill	9,760 (I)
Herring gull	4,226 (AON)	Puffin	768 (AOB)
Angus			
Fulmar	1,185 (AOS)	Kittiwake	2,926 (AON)
Cormorant	29 (AON)	Roseate tern	1 (AON)
Shag	21 (AON)	Common tern	50 (AON)
Black-headed gull	19 (AON)	Arctic tern	82 (AON)
Lesser black-backed gull	7 (AON)	Guillemot	1,002 (I)
Herring gull	1,060 (AON)	Razorbill	562 (I)
Great black-backed gull	8 (AON)	Puffin	190 (AOB)
North east Fife			
Fulmar	887 (AOS)	Roseate tern	2 (AON)
Shag	734 (AON)	Common tern	303 (AON)
Lesser black-backed gull	1,203 (AON)	Arctic tern	910 (AON)
Herring gull	2,846 (AON)	Little tern	5 (AON)
Great black-backed gull	27 (AON)	Guillemot	28,103 (I)
Kittiwake	3,639 (AON)	Razorbill	4,114 (I)
Sandwich tern	300 (AON)	Puffin	42,000 (AOB)
Kirkcaldy			
Fulmar	401 (AOS)	Kittiwake	349 (AON)
Cormorant	85 (AON)	Guillemot	48 (I)
Shag	21 (AON)	Razorbill	85 (I)
Lesser black-backed gull	3,282 (AON)	Puffin	1,641 (AOB)
Herring gull	3,590 (AON)		

Notes: AON = Apparently Occupied Nests; AOS = Apparently Occupied Sites; AOT = Apparently Occupied Territories; AOB = Apparently Occupied Burrows; I = Individual birds.

Major colonies along the east coast of Scotland include the one at Fowlesheugh (Kincardine and Deeside). Here the numbers of kittiwake were found to have decreased by around 10% (22,051 AON for SCR Census (1985-1988) to 19,842 for Seabird 2000 (1998-2000)) and by 45% at nearby Turturra Heughs (5,674 AON for SCR Census (1985-1988) to 3,098 AON for Seabird 2000 (1998-2000)). Fowlesheugh also supports one of the largest colonies of guillemot in Britain with 61,420 individuals recorded during Seabird 2000 (1998-2000), an increase of 17% from that recorded during the SCR Census (1985-1988). The Isle of May (Fife) supports one of the largest colonies of common tern in Britain (303 AON). This Isle also supports 28,103 individual guillemots, and 42,000 AOB for puffin (Mitchell *et al.* 2004).

Inchkeith (Kirkcaldy – Firth of Forth) supports large numbers of seabirds including, lesser black-backed gull (3,276 AON) and puffin (1,641 AOB). Cormorants are also found on Inchkeith (85 AON) as well as three other colonies in the Firth of Forth: Car Craig (100 AON, a 27% decrease since SCR Census); Craigleith (56 AON, a 49% decrease since SCR Census) and The Lamb (134 AON, a 29% increase since SCR Census) (Mitchell *et al.* 2004). Considerable interchange of breeding birds was found to occur between the colonies in the Firth of Forth.

Table A5.3d - Breeding seabird numbers from administrative areas in SEA 5: South east coast of Scotland

Species	Number of breeding birds (Seabird 2000 count (1998-2002))	Species	Number of breeding birds (Seabird 2000 count (1998-2002))
City of Edinburgh			
Fulmar	228 (AOS)	Great black-backed gull	2 (AON)
Shag	33 (AON)	Common tern	700 (AON)
Lesser black-backed gull	323 (AON)	Puffin	22 (AOB)
Herring gull	424 (AON)		
East Lothian (including Bass Rock)			
Fulmar	1,051 (AOS)	Great black-backed gull	11 (AON)
Gannet	44,110 ¹ (AOS/AON)	Kittiwake	3,349 (AON)
Cormorant	190 (AON)	Little tern	2 (AON)
Shag	298 (AON)	Guillemot	8,266 (I)
Lesser black-backed gull	1,470 (AON)	Razorbill	566 (I)
Herring gull	3,553 (AON)	Puffin	28,412 (AOB)
Berwickshire			
Fulmar	1,060 (AOS)	Great black-backed gull	1 (AON)
Cormorant	36 (AON)	Kittiwake	18,739 (AON)
Shag	349 (AON)	Guillemot	44,636 (I)
Black-headed gull	90 (AON)	Razorbill	3,534 (I)
Lesser black-backed gull	1 (AON)	Puffin	21 (AOB)
Herring gull	945 (AON)		

Notes: ¹ Not surveyed in 1998-2000, extrapolated estimate for 1999 based on previous colony-specific trends. AON = Apparently Occupied Nests; AOS = Apparently Occupied Sites; AOT = Apparently Occupied Territories; AOB = Apparently Occupied Burrows; I = Individual birds.

Fidra, in the Firth of Forth, saw an increase of over 300% in the population of lesser black-backed gulls, with 599 AON recorded during Seabird 2000 (1998-2002).

One of the largest common tern colonies in Britain is found at Leith Dock (City of Edinburgh) which supports 690 AON (Mitchell *et al.* 2004). In 1986 a colony of 18 Roseate terns (AON) was recorded on Inchmickery in the Firth of Forth, which was later abandoned with the birds thought to have moved to nearby islands. The Seabird 2000 (1998-2002) survey and the annual seabird breeding bird survey found that numbers have declined to only one pair (Mavor *et al.* 2003, Mitchell *et al.* 2004). Despite this apparent decline, the importance of these islands for this species is reflected in the recent extension of the Firth of Forth Islands

Special Protection Area to include the island of Long Craig in the 106 hectare SPA site. This SPA encompasses a number of separate islands or island groups (Scottish Executive news page 16/02/04).

A survey of roof-nesting lesser black-backed gulls in the City of Edinburgh was impossible during the Seabird 2000 survey, nevertheless the population is estimated to have substantially increased over the last ten years. Declines of 14% and 40% in herring gull populations on the Firth of Forth islands of Craighleith and Inchcolm respectively, contribute to the overall decline seen in Scotland between both Operation Seafarer (1969-70) and SCR Census (1985-1998) and between the SCR Census (1985-1988) and Seabird 2000 (1998-2002) survey.

Bass Rock, which supports an estimated 44,110 AON/AOS (Mitchell *et al.* 2004), is one of the world's biggest gannetries. During the breeding season adult gannets from the Bass Rock colony, have been recorded foraging up to 540km away (Hamer *et al.* 2000), with many birds staying much closer. Gannet chicks leave the colonies during August and September and remain on the sea surface for a short period of time (approximately one week) until they are able to fly (Tasker *et al.* 1986). The fastest growing gannetry in Britain is at Troup Head. No AOS/AON were recorded there during the 1968-70 census and two AOS/AON were recorded during the 1984-85 census. By the 1994-95 survey this had risen to 530 AOS/AON and by the Seabird 2000 Census (1998-2000) 1,085 AOS/AON had been recorded (Mitchell *et al.* 2004).

The Seabird 2000 survey (1998-2002) found that the number of shags recorded on the cliffs from St. Abb's Head to Fast Castle Head had declined by around 47% since the SCR Census (1985-1988) (626 AON recorded in Seabird 2000, and 329 AON recorded in SCR Census). The coastline at St. Abb's Head to Fast Castle Head also supports 16,223 breeding kittiwakes (AON), which is a decline of 19% from that recorded during the SCR Census (Mitchell *et al.* 2004). However this area recorded an increase of 74% in the number of individual guillemot between the SCR Census and the Seabird 2000 survey to 43,744 birds.

The following further describes those species of seabird which breed in the SEA 5 area. Population estimates for some species have previously been given in SEA 4, and these figures have not changed in the 2003 edition of "*Seabird numbers and breeding success in Britain and Ireland, 2002*" (Mavor *et al.* 2003). Where population estimates had not previously been included or where there has been a change in the population estimate, figures have been included.

Petrels

The fulmar, the commonest seabird around northern Britain, is the largest of the four species of petrel which breeds in Britain (Mitchell *et al.* 2004). This species feeds at sea taking crustaceans, cephalopods and small fish, as well as offal discarded from trawlers. Fulmars occupy their colonies for more months of the year than any other British seabird (Lloyd *et al.* 1991) and once adult, fulmars are present year-round with no pronounced migration, instead dispersing from colonies following the breeding season to return early the following year.

In Britain, small regional changes were observed for fulmars between 2001 and 2002 and taking into account intra-regional variation, the longer term trend in regional numbers for this species is one of decline, stability or levelling off in the rate of increase (Mavor *et al.* 2003). In the north of the SEA 5 region, increases in breeding success were observed at sites in Shetland (Westerwick, Sumburgh Head, Troswick Ness and Fair Isle), with decreases at Hermaness and Noss. The Isle of May season was considerably higher than that of 2001

and slightly above the long-term average for the island (Wilson *et al.* 2002, as cited in Mavor *et al.* 2003).

Fulmars occur over vast areas of the North Sea in all seasons and at no time is a single area of international importance (Skov *et al.* 1995). Maximum densities around Shetland and Orkney, northern North Sea and inshore areas off eastern Scotland are found between March and April (Tasker *et al.* 1986).

The storm petrel is the smallest species of seabird nesting in Britain and both the storm petrel and Leach's petrel feed only at sea and usually far from land (Lloyd *et al.* 1991). At present, due to their patchy distribution and nocturnal habits, the presence of non-breeders and nest sites consisting of deep burrows, cavities or crevices in remote areas, there is no accurate method for censusing petrels and estimates for total breeding numbers of both species of petrel remain uncertain. There are an estimated 41+ colonies of breeding storm petrel and 6+ colonies of breeding Leach's petrel in Britain (Mavor *et al.* 2003). Within SEA 5, breeding sites are found on Shetland and Orkney

Storm petrels are present at their breeding colonies from May to September, and occur in the surrounding waters. Outwith the breeding period they disperse into the open sea, probably most in the South Atlantic, off the coasts of Namibia and South Africa, south to 38°S (JNCC website). In 2002, storm petrels on Mousa (Shetland) had a successful breeding season, however attempts at locating breeding storm petrels on Noss failed to find any birds.

Within SEA 5 Leach's petrel breed only at sites on the west of Shetland and Orkney and are also present at their colonies from May to September, during which time they tend to feed at sea close to their colonies. During September to November, while some birds sporadically occur in British waters, the majority of the population migrates south and over-winters in tropical waters (JNCC website, Lloyd *et al.* 1991).

Gannet

The Northern gannet, which is the largest of the seabirds breeding in Britain, breed for the first time at five or six years of age (Nelson 1979, cited in Lloyd *et al.* 1991). In Britain, most gannets nest on Scottish offshore islands and are present at their colonies from March to September, during which time they tend to feed in waters relatively close to the colonies (JNCC website, Stone *et al.* 1995). Outwith the breeding period gannets are pelagic and move out of the North Sea in winter to inshore European waters and more widely in the North Atlantic as far south as West Africa (JNCC website, Skov *et al.* 1995).

From September to October, high numbers of gannets are found along the eastern coast of Shetland, the outer Moray Firth, Firth of Forth and the south east coast of Scotland, while highest numbers are found around the Firth of Forth Islands from November to February. During the pre-breeding season (March-April) the area north of Shetland is of international importance for gannets (Skov *et al.* 1995), while during the breeding season gannets range widely and many birds are found at considerable distance from their colonies (Skov *et al.* 1995).

The single rock gannetry at Bass Rock is one of the biggest of its kind in the world and can support an estimated 100,000 gannets (Scottish Seabird Centre website). Gannets return to the Rock from January to find their mate and their old nest and will remain for most of the year until around October. The total population estimate for gannets in Britain increased from 207,100 pairs in 2001 to 207,300 pairs in 2002 (Mavor *et al.* 2003). Only the colony on Fair Isle was counted on both 2001 and 2002, and in 2002 this colony was found to have

increased to 1,585 AON. This colony continues to grow in size and with over 1,000 immature birds consistently recorded in recent years, this colony is expected to continue growing (Mavor *et al.* 2003).

Cormorants

The cormorant is found in coastal waters, estuaries, freshwater lakes and reservoirs, while the shag, which is also found in coastal waters, is sometimes found in estuaries, but rarely enters freshwater (Lloyd *et al.* 1991). Breeding numbers of cormorants in Shetland showed an increase between 2001 and 2002, with an increase also seen between these years at North Sutor. In the south east of Scotland, overall breeding numbers remained stable. Important areas for cormorants within the SEA 5 region are the Moray Firth and the Firth of Forth.

In the UK, shags are restricted to rocky coasts and stay close to their breeding colonies throughout the year (Stone *et al.* 1995). Outside the breeding season the species' distribution remains coastal but they may disperse along the coast seeking feeding grounds and shelter (JNCC website, Skov *et al.* 1995). In the SEA 5 region, the largest colonies of shags are found on the Isle of May (676 AON) and North Sutor (374 AON), with North Sutor recording its highest level since monitoring started in 1991. In 2002, the population on both Inchkeith and Fidra increased by over 33% while the population on Inchmickerey increased by over 26%. Densities of shag along the Scottish east coast between Rattray Head in the north and Falborough Head in the south are highest in January and March, with highest concentrations found at breeding colonies in the Firth of Forth (Tasker *et al.* 1986).

Gulls

In Britain and Ireland, only around one-fifth of common (Mew) gulls breed on the coast, with the rest breeding inland (JNCC website). Over 90% of common gulls breeding in Britain occur in Scotland with the main breeding concentrations in Orkney. Orkney is estimated to support more than half of the total number of common gulls breeding on the coasts of Britain and Ireland (Mitchell *et al.* 2004). In 2002, the colony at Nigg increased by over 29% to 142 AON to reach its highest count since recording started in 1990.

The breeding colonies of the lesser black-backed gull are found on offshore islands, in coastal sand dunes and on islets in brackish or tidal lagoons, while some birds breed inland on lakes or moorland (Lloyd *et al.* 1991). This species is highly migratory. Generally, the east coast of Scotland is less important for this species than the west coast, with the exception of the Moray Firth and Firth of Forth areas (Stone *et al.* 1995). Nine of the Forth Islands surveyed by the JNCC's annual seabird monitoring programme in 1994 and 2002 revealed a decrease of 9.5% over the period from 5,878 pairs to 5,322 (Mavor *et al.* 2003), while the Bass Rock population declined from 25 pairs in 2000 to just one pair in 2002.

The herring gull is the commonest of the three species of large gull breeding in Britain (Lloyd *et al.* 1991). Although it breeds and feeds mostly on the coasts it is also often seen far inland and breeding colonies cover a variety of habitats. In 2002 the colony at Nigg increased by over 28% to 269 pairs (Mavor *et al.* 2003). At this site the majority of birds nest on roofs or large work sheds. There was a decline in population (44.3%) at the Sands of Forvie National Nature Reserve (NNR) between 2000 and 2001 and this continued through 2002 when 177 pairs were recorded, which accounts for less than one-third of the peak count of 575 pairs recorded in 1998 (Mavor *et al.* 2003).

Overall numbers of herring gull in the south east of Scotland fell by 8.2% since 2001. Declines were recorded at seven of the nine colonies surveyed, with both the Isle of May and St. Abb's Head recording decreases of greater than 10%. An increase of 54.3% however, was recorded at Fidra in 2002.

From November to February, large numbers of herring gulls are dispersed in coastal waters along the east coast of Scotland from the Shetland Islands to the Firth of Forth with particularly high numbers found around the Moray Firth area and the Dutch Bank (northern North Sea - south east of Shetland), the latter of which is of international importance during this period (Skov *et al.* 1995). Between March and April the northeast coast is of greater importance, with high numbers still found throughout the Moray Firth, the Dutch Bank, Fair Isle (which is of international importance during March and April) and off the east coast of Shetland (Stone *et al.* 1995, Scov *et al.* 1995).

Great black-backed gulls are the largest of the gulls nesting in Britain and can sometimes be seen far from land following fishing boats (Lloyd *et al.* 1991). In 2002 the colony at Nigg increased to 173 pairs and productivity was high (1.95 chicks from 134 monitored nests), while in the southeast of Scotland, despite a decline in numbers on the Isle of May (27 pairs in 2001 to 20 pairs in 2002), combined data for this and several Firth of Forth island sites revealed only a small overall decrease.

During the pre-breeding and breeding season the distribution of great black-backed gulls is predominantly coastal, while in winter their distribution is more widespread (Stone *et al.* 1995) and they are common in offshore areas of the North Sea from September to April (Tasker *et al.* 1986). The Moray Firth is of international importance for this species from November to February, while large numbers are also found in the Firth of Forth at this time (Scov *et al.* 1995). From March to April the highest numbers of great black-backed gull are found around the Northern Isles.

The most oceanic of the gulls which breed in Britain is the kittiwake and this species can often be seen far from land (Lloyd *et al.* 1991). It is thought that kittiwakes may move between colonies; therefore, year to year changes in numbers at sample colonies may not actually reflect larger scale regional population changes (Mavor *et al.* 2003). In Shetland (including Fair Isle), the total population of kittiwakes continued to decrease in 2002, resulting in an overall decrease of 72% since 1981. A pattern of decline was also recorded at several other east coast colonies: North Sutor, Portknockie and Sands of Forvie (Mavor *et al.* 2003). However, the sample colonies on the south east coast of Scotland (Isle of May, Firth of Forth Islands, Bass Rock and St. Abb's Head) all showed increases.

Numbers of kittiwake in the North Sea are relatively low until February when numbers increase in offshore areas around breeding colonies, most notably around Orkney, Shetland, Caithness and the Moray Firth. Numbers then increase in inshore areas and decrease offshore as birds move to their breeding sites. Between August and October densities increase in the Moray Firth while peak numbers in offshore northern areas occur in November.

Terns

Substantial numbers of terns are present offshore in May with concentrations off main breeding colonies in June. Large numbers are present offshore, particularly in the northern North Sea in July/August, after the young have fledged, before a southward movement in late August (Tasker *et al.* 1986).

The sandwich tern is the largest of the five species of tern which breed in Britain and Ireland (Lloyd *et al.* 1991). Due to large variations in the proportion of mature birds attempting to breed and the mass movements of birds among colony sites, the sandwich tern population exhibits the most erratic trends and distribution of any seabird breeding in Britain (Mitchell *et al.* 2004). During 2002, breeding numbers in the north-east of Scotland increased by 21% at the Sands of Forvie (975 pairs) the highest number of birds recorded at the site since 1991. This is in contrast to the south-east of Scotland where no sandwich terns were recorded breeding at any of the sites surveyed in 2002 (Mavor *et al.* 2003).

Sandwich terns are summer visitors to the main breeding colonies in Britain. They are seen between April and October and are virtually absent in winter (Stone *et al.* 1995). Substantial numbers are present offshore in May with concentrations of birds off main breeding colonies (in SEA 5 area these are Sands of Forvie and Isle of May).

Roseate terns have specialised foraging and nesting habitat requirements and consequently have one of the most restricted ranges of any seabird in Britain and Ireland with most of the population breeding at only three colonies. Roseate terns are therefore of high conservation concern in both Britain and Ireland. Along the east coast of Scotland the Seabird 2000 survey found numbers to have declined to a single pair, breeding on an island in the Firth of Forth.

Colonies of common tern occur around most of the UK coast, as well as inland on lakes, reservoirs and gravel pits (Lloyd *et al.* 1991, Mitchell *et al.* 2004). In 2002 the common tern population in the north of Scotland increased by 11% to 568 pairs, with increases seen at Alness Point and Barmac's. In contrast, the population at Nigg decreased by 52% to a below-average of 139 pairs (Mavor *et al.* 2003). Decreases were recorded at several colonies including the Loch of Strathbeg (decrease of 61% to 22 pairs) and Kirkhill (decrease of 80% to approximately 12 pairs). There was a 98% decline (from 132 pairs in 2001 to 2 pairs in 2002) recorded on the Isle of May to the lowest level since 1980.

Arctic terns are the commonest tern breeding in Britain and they utilise a variety of nesting habitats (grasslands, dunes, moorland near the coast, offshore islands and inland lochs) (Lloyd *et al.* 1991). In 2002, there was an overall decrease of 71% in breeding numbers at seven sites monitored in Shetland, with dramatic decreases recorded on Fair Isle to the lowest count for 15 years. In contrast, four sites surveyed in Orkney showed an overall increase. The north of Scotland recorded an overall decrease in breeding numbers, with the largest decline recorded at the colony at Nigg. However, numbers in the northeast of Scotland recovered from the decline recorded in 2001 with increases noted at the Sands of Forvie colony and St. Fergus (Mavor *et al.* 2003). In the southeast of Scotland, on the Isle of May, the lowest breeding population since 1988 was recorded, with severe weather at the beginning of the season thought to have been a contributing factor (Wilson *et al.* 2002, as cited in Mavor *et al.* 2003).

The smallest of the five tern species breeding in Britain is the little tern which breeds exclusively on the coast (Mitchell *et al.* 2004). Little tern do not forage far from breeding sites therefore they nest close to shallow sheltered feeding areas where they can easily locate prey. The Seabird 2000 survey found that little terns no longer breed in either Kincardine and Deeside or Angus and that the colony at Forvie remains the largest colony in Scotland and that two new colonies, albeit of just 2 AON, were found on Orkney (Mitchell *et al.* 2004).

Auks

The guillemot, the largest of the four auk species which breed in Britain, are extremely gregarious with colonial breeding sites reaching numbers of many tens of thousands of individuals (Lloyd *et al.* 1991). Guillemots are a dispersive rather than a migratory species, as many adults remain within a few hundred kilometres of the colonies throughout the year. Adults at some colonies continue to visit nest sites in late autumn and winter once the main moult of the year (post-breeding) has been completed (Mitchell *et al.* 2004).

Colonies which are annually surveyed for the JNCC *Seabird numbers and breeding success in Britain and Ireland* publication (Mavor *et al.* 2003) include Hermaness, Noss and the SOTEAG monitoring plots at Burrovoe, Troswick Ness and Sumburgh Head in Shetland, Craighleith, The Lamb, Isle of May, Bass Rock and St. Abb's Head.

Between March and April in the SEA 5 area, highest densities of guillemots are found close to the main breeding colonies in the Northern Isles, the Moray Firth and the Firth of Forth. At this time guillemots do not visit the colonies on a daily basis and are potentially able to travel long distances to forage. Highest densities are also found at the aforementioned main colonies from May to June, when guillemots are occupied with egg incubation or chick rearing. Birds remain close to the colonies and while observations have shown that guillemots carry fish back to the colonies from up to 55km away, most are thought to forage much closer to the colonies (Stone *et al.* 1995).

From late June, the first chicks leave the colony with the male parent and spend much of their time sitting flightless on the surface of the sea. The departure continues throughout July resulting in moderate to high densities found across the entire northern North Sea, as well as high densities remaining close to the colonies. Colonies are deserted by the end of August when fledging has finished. Subsequently, large concentrations of guillemots are found off the northeast coast of Scotland, which remain there throughout September and October. From November to February guillemots can be found throughout the North Sea with highest densities typically found away from land, off the eastern coasts of Scotland and England. High densities can still be found in the inner regions of the Moray Firth during this time, with moderate densities persisting in the Firth of Forth (Stone *et al.* 1995).

Razorbills which breed in Britain and Ireland winter from southwest Norway to Iberia and from North Africa into the western Mediterranean. Immature razorbills tend to move significantly further from their natal colonies and generally further south than adults (Merne 2002 as cited in Mitchell *et al.* 2004). Since the SCR Census (1985-88) the number of razorbills have increased at the major colonies along the east coast of Scotland: Berriedale Cliffs (east Caithness) and Fowlsheugh (Mitchell *et al.* 2004). In 2002 the annual breeding seabird survey also found that whole-colony counts at Bass Rock and several islands in the Firth of Forth (Inchkeith, Craighleigh, Fidra and Lamb) had increased, with a decrease recorded on the Isle of May (Mavor *et al.* 2003).

During the incubating and chick-rearing season (April to June), razorbills are generally confined to coastal areas, with densities highest in the Moray Firth and the west coast of Scotland. Despite large numbers of razorbills breeding on the Northern Isles, densities of birds around Orkney and Shetland are generally low to moderate during this period. In July when razorbill chicks are fledging, concentrations can be found offshore of the Firth of Forth, in the outer Moray Firth and off the northeast coast of Scotland, with low densities extending further out to sea than that seen in the previous months. Distribution extends even further out to sea between August and September, with densities increasing along the east of Scotland, reflecting dispersal away from colonies following breeding. High densities remain off the Firth of Forth in October with low densities remaining along the east coast of Scotland

throughout the autumn and winter (Stone *et al.* 1995). Like guillemots, razorbills spend much of their time on the surface of the sea.

Of the two smallest auks breeding in Britain, the puffin (Lloyd *et al.* 1991) generally has its colonies on offshore islands or inaccessible mainland cliffs. Within the SEA 5 area, Fair Isle and the Isle of May remain amongst the largest colonies supporting 42,000 AOB and 40,000 pairs respectively (Mitchell *et al.* 2004).

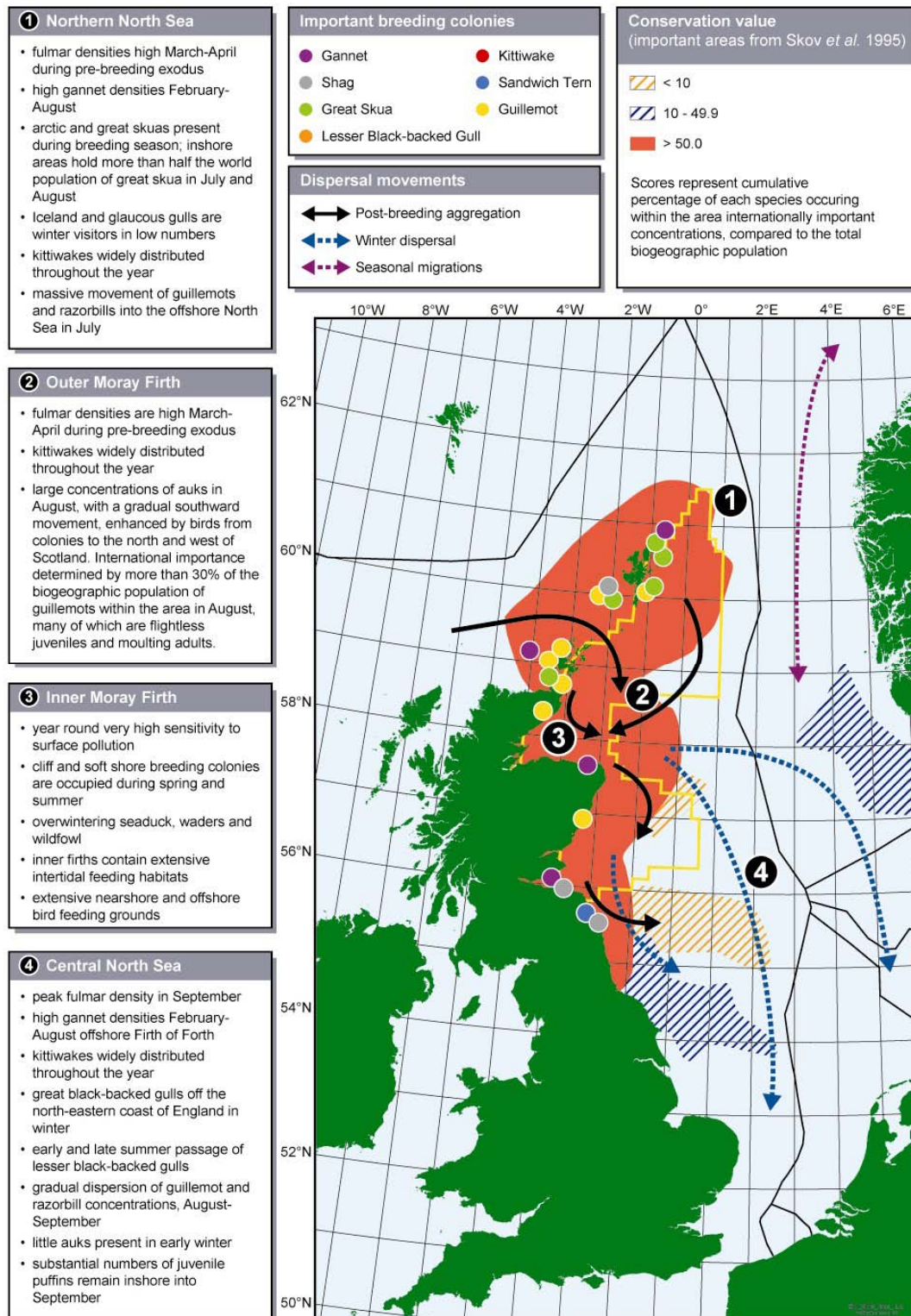
Like the other two auk species described above, puffins spend a lot of time on the surface of the sea, especially during late winter and early spring (February to March) when they are flightless. At this time low densities of puffins are dispersed over the whole of the North Sea. Between April and May breeding pairs incubate a single egg and in the SEA 5 area, high densities can be found around colonies on Shetland. High densities are also found around the Northern Isles and the Firth of Forth from June through to July when adults regularly need to return to the colonies. Chicks start to fledge in July and by August/September puffins have left the colonies and are generally concentrated a little way offshore off the east coast of Scotland. Densities are generally low and widely dispersed off the east coast of Scotland between October and January (Stone *et al.* 1995).

The other small species of auk breeding in Britain is the black guillemot which nests in hidden cavities on cliffs or in boulder scree and storm beaches (Lloyd *et al.* 1991). The southeastern limit of this species range is Muchalls, 15km south of Aberdeen (Mitchell *et al.* 2004) with strongholds found on the Northern Isles, in particular Shetland. *Seabird 2000* recorded nearly 6000 individual pre-breeding black guillemots on Orkney with nearly 16,000 pre-breeding individuals recorded on Shetland. In Yell Sound, the population of black guillemots has increased since 1985 but has been relatively stable since 1993, as it has elsewhere in Shetland. In contrast, the populations on Fair Isle and Orkney have been undergoing significant long-term declines since 1983, despite increases recorded between 2001 and 2002 (Mavor *et al.* 2003).

Black guillemots tend to remain close to colonies during the pre-breeding and breeding seasons (April to July), with most important areas found around Shetland, Orkney, the northeast, (particularly the Moray Firth) and west coasts of Scotland and the coast of Northern Ireland (Stone *et al.* 1995). This species usually remain inshore throughout the year with only one or two birds observed far offshore (Stone *et al.* 1995, Skov *et al.* 1995).

Generalised distribution patterns and movements of seabirds in the SEA 5 area and adjacent waters are summarised in Figure A5.1.

Figure A5.1 - General seabird distribution and movement



In general, nearshore waters of Shetland, Orkney and the east coast of Scotland hold vulnerable concentrations of birds virtually throughout the year (Stone *et al.* 1995). After the breeding season, species that feed further offshore such as fulmar, gannet, kittiwakes, guillemot, puffin and razorbill leave coastal waters close to the islands.

Waterbirds

Within SEA 5 there are a number of estuarine and non-estuarine areas, and species assemblages vary greatly with the exposure of the coast and type of substrate. For example, species such as dunlin are attracted to sheltered muddy substrates of estuaries, while sandier areas hold larger numbers of knot and oystercatcher. The predominantly soft cliffs, rocky shores and sandy stretches of non-estuarine areas support fewer waders than that seen in estuaries

Breeding birds

The Moray Firth is important for breeding waders and other waterbirds as well as being an overwintering and/or temporary feeding ground during the spring and autumn migration for species breeding in the north (Table A5.4).

Table A5.4 - Waterbird species known to breed in SEA 5

Divers and grebes	Rails, crakes and coots	Wildfowl (including ducks, shelduck, geese and swans)	Waders
Red-throated diver (<i>Gavia stellata</i>) Slavonian grebe (<i>Podiceps auritus</i>)	Coot (<i>Fulica atra</i>)	Teal (<i>Anas crecca</i>) Mallard (<i>Anas platyrhynchos</i>) Pintail (<i>Anas acuta</i>) Wigeon (<i>Anas penelope</i>) Red-breasted merganser (<i>Mergus serrator</i>) Shoveler (<i>Anas clypeata</i>) Eider (<i>Somateria mollissima</i>) Tufted duck (<i>Aythya fuligula</i>) Gadwall (<i>Anas strepera</i>) Shelduck (<i>Tadorna tadorna</i>) Greylag goose (<i>Anser anser</i>) Mute swans (<i>Cygnus olor</i>)	Whimbrel (<i>Numenius phaeopus</i>) Redshank (<i>Tringa tetanus</i>) Lapwing (<i>Vanellus vanellus</i>) Snipe (<i>Gallinago gallinago</i>) Red-necked phalarope (<i>Phalaropus lobatus</i>) Dunlin (<i>Calidris alpina</i>) Black-tailed godwit (Icelandic race) (<i>Limosa limosa</i>) Ringed plover (<i>Charadrius hiaticula</i>) Oystercatcher (<i>Haematopus ostralegus</i>) Golden plover (<i>Pluvialis apricaria</i>) Greenshank (<i>Tringa nebularia</i>) Curlew (<i>Numenius arquata</i>) Common sandpiper (<i>Actitis hypoleucos</i>) Temminck's stint (<i>Calidris temminckii</i>) (small number)

The Shetland Islands are a major stronghold of the whimbrel, with approximately 95% of Britain's breeding population found on the islands (May & Law 1997). The islands are also a stronghold for red-necked phalarope, with Fetler supporting around 90% of the British breeding population. Half of the British breeding population of red-throated diver (approximately 700 pairs on Shetland, Gibbons *et al.* 1993), utilise both coastal areas and boggy moorland of Shetland and regularly commute several kilometres between nesting and foraging areas (May & Law 1997).

Breeding waterfowl assemblages in Orkney are very diverse with very high densities of breeding birds, particularly waders. Curlew populations in Orkney are considered to be amongst the most dense in Europe (Meek 1997), with numbers at levels of international importance – 4% of the northwest and central European breeding population. Other breeding wader species that occur at levels of international importance include the oystercatcher (5% of northwest and central European breeding population) and ringed plover (4%), both of which nest in coastal habitats (sand, shingle, machair or adjacent farmland). In addition to these, more than 1% of the British breeding population of whimbrel, lapwing, redshank, dunlin and snipe are present, making the region nationally important for these species.

Duck species that breed in Orkney in nationally important numbers include: wigeon, red-breasted merganser, shoveler, eider; teal; mallard; tufted duck and shelduck. Orkney supports one of Scotland's main concentrations of shelduck (100-150 pairs), nesting in holes in coastal and estuarine areas.

Further south within SEA 5, the Moray Basin salt marshes and grasslands have a very diverse breeding wader assemblage and high overall breeding wader density compared to elsewhere in Britain, while the coastal wetlands of the area are, collectively, of international importance for breeding waterbirds, particularly waders (Craddock & Stroud 1996).

The most important areas for breeding waterbirds in the southern part of SEA 5 include the Montrose Basin, Aberlady Bay and the Forth Estuary. Table A5.5 below describes the breeding densities of species of wader within SEA 5. Breeding eider reach nationally important levels at the Montrose Basin and the area is also important for summer moulting assemblages of eider (Heath & Evans 2000).

Table A5.5 - Breeding densities (pairs/sq.km) of six common species of wader

Site	Oystercatcher	Ringed Plover	Lapwing	Curlew	Redshank
Shetland	8.3	-	4.9	3.6	2.7
Orkney	15.8	-	8.7	6.6	2.8
Dornoch Point	12	2	7	2	28
Morrish More	12	-	5	4	54
Nigg Bay	21	3	4	-	19
Udale Bay	9	9	-	-	3
Conon Island	3	-	3	6	49
Beaully Firth	18	-	4	-	40
Culbin	19	-	-	-	7
Findhorn	14	-	-	2	33
Montrose Basin	24	-	31	5	54
Skinflats	4	-	13	-	36
Aberlady	-	4	40	-	72

Source: (Whyte et al. 1995, Gill 1994, Dodds et al. 1995, O'Brien 1994, O'Brien & Smith 1992, cited in Meek 1997, Allport et al. 1986, cited in Craddock & Stroud 1997 & May & Law 1997)

Snipe were also recorded in Shetland and Orkney (6.7 and 5.0 pairs/km² respectively) and at Aberlady (11 pairs/km²). At Dornoch Point and Conon Island, dunlin were recorded (2 and 3 pairs/km², respectively). For birds that utilise estuarine and mud flat habitats the most important areas in the region are: Loch Fleet, Dornoch Firth, Cromarty Firth, Beaully/Inner Moray Firth, Culbin Sands and Findhorn Bay.

Wintering and migrant birds

In spring and autumn, the coastline and estuaries of the SEA 5 region are important for migrant waterbirds. The estuarine and non-estuarine areas are also important for moulting waders dispersing from the Wadden Sea in the autumn and as the region lies on a major migratory flyway, many birds pass through and utilise the region as a staging post during onward migration to wintering grounds (Rehfishch *et al.* 2003).

Key areas

North

Shetland supports several sites of international importance for eider ducks, with large concentrations occurring in August (moulting period). Shetland also supports internationally important numbers of great northern diver (*Gavia immer*) and slavnian grebe as well as nationally important numbers of long-tailed duck (*Clangula hyemalis*) and red-breasted merganser (Barton & Pollock 2004). The most abundant wintering wader species are turnstone (*Arenaria interpres*) and redshank (May & Law 1997).

Orkney supports internationally important concentrations of great northern diver, slavnian grebe and eider, with key areas including Scapa Flow, Deer and Shapinsay Sounds, Tankerness (Pollitt *et al.* 2003) and the Sounds around Wyre. Seven other species occur in nationally important numbers: red-throated and black-throated diver (*Gavia arctica*), red-necked grebe (*Podiceps grisegena*), long-tailed duck, velvet scoter (*Melanitta fusca*), goldeneye (*Bucephala clangula*) and red-breasted merganser (Barton & Pollock 2004). Key wintering species of wader include purple sandpiper, curlew and turnstone, while Orkney is also of note for some key species on autumn and spring passage including whooper swan (*Cygnus cygnus*), ringed plover, whimbrel, ruff (*Philomachus pugnax*) and the northern race of golden plover (Meek 1997). The islands also hold internationally important concentrations of mute swan between October and December and greylag geese in winter, while barnacle geese (*Branta leucopsis*) from Greenland winter on Switha and in the South Walls area (Barton & Pollock 2004).

The Moray Firth is of international importance for seaduck, most of which occur within 5km of the shore. Large flocks are also regularly recorded in the outer Dornoch Firth, off Culbin Sands, off Burghead Bay and in Spey Bay. Slavonian grebe and eider also occur in internationally important numbers, and numbers of great northern diver have exceeded the international threshold of 50 birds in some recent years. The Moray Firth is also of national importance for black-throated diver (Pollitt *et al.* 2003).

Wintering waders are widely distributed throughout the inner Moray Firth. Major concentrations can be found on the large intertidal areas at Loch Fleet, Dornoch Sands, Tain Bay, Morrich More, Nigg Bay, Udale Bay, Munlochy Bay, Longman Bay, Fort George to Whiteness sands, Castle Stuart, Findhorn Bay and Culbin Sands. The most widespread wader species during winter include oystercatcher, curlew, bar-tailed godwit (*Limosa lapponica*) redshank, knot (*Calidris canutus*) and dunlin and the Moray Firth is of international and national importance for several of these species (Pollitt *et al.* 2003). The Cromarty Firth itself, attracts internationally important populations of redshank, knot, wigeon and bar-tailed godwit (Pollitt *et al.* 2003, Moray Firth Partnership website).

Several sites in the Moray Firth support internationally significant numbers of both swans and geese in winter. The Inner Moray Firth supports internationally important numbers of mute swans between October and December, both the Dornoch Firth and Loch Fleet are internationally important for greylag geese and both greylag and pink-footed geese (*Anser*

brachyrhynchus) occur in internationally important numbers in Findhorn Bay, Loch Eye and the Cromarty Firth (Barton & Pollock 2004).

East

The Aberdeenshire coast supports internationally important numbers (>1% of the biogeographic population) of eider, from Donmouth to the Ythan estuary (Barton & Pollock 2004). This stretch of coastline also supports nationally important numbers of red-throated diver and common scoter. Red-throated diver numbers generally peak in late spring, while concentrations of eider and common scoter (*Melanitta nigra*) peak in late summer. The Ythan Estuary/Slains lochs area also supports internationally important numbers of pink-footed geese and redshank and nationally important numbers of eider (Pollitt *et al* 2003). Wintering red-breasted merganser are found mainly in estuaries and numbers tend to peak in December and decline from March onwards. The rocky shorelines in the Aberdeenshire area are of international importance for purple sandpiper (*Calidris maritima*) and turnstone (*Arenaria interpres*) (Stroud & Craddock 1996) and the most abundant wader species along this stretch is the oystercatcher, followed by knot, redshank, ringed plover, curlew, purple sandpiper and golden plover.

The Loch of Strathbeg is internationally important for whooper swans, pink-footed geese and barnacle geese from the Svalbard breeding population during autumn and winter, while the area around the Ythan Estuary and Meikle Loch also holds internationally important numbers of pink-footed geese (Barton & Pollock 2004).

Numbers of eider at Montrose Basin are above the nationally important threshold. Red-throated diver, long-tailed duck, common and velvet scoter and red-breasted merganser also regularly occur in nationally important numbers off the Angus coast, with the main concentrations found at Lunan Bay, Montrose Basin, off Carnoustie and Kinnaber. The Montrose Basin is also of international importance to pink-footed geese (particularly in October and November) and redshank, and of national importance to moulting mute swans, with peak numbers found between July and September (Barton & Pollock 2004). Nationally important numbers of shelduck, wigeon, goosander (*Mergus merganser*) and knot also occur at the Montrose Basin during winter (Pollitt *et al.* 2003).

South

The Tay/St. Andrews Bay/Eden Estuary area is important for wintering waterbirds. The largest wintering flock of eider in the UK occurs at the mouth of the Tay estuary, usually in October or November (Barton & Pollock 2004), while red-throated diver, slavonian grebe, scaup (*Aythya marila*), long-tailed duck, common and velvet scoter and red-breasted merganser occur in nationally important numbers in the area (Barton & Pollock 2004). The Eden Estuary is notable for its passage bar-tailed godwit and supports the most northerly wintering flock of black-tailed godwit in Britain, (the SOC website <http://www.the-soc.fsnet.co.uk/soc-home.htm>). The Tay supports notable numbers of autumn passage redshank (May & Law 1997) and is internationally important for bar-tailed godwit, pink-footed geese and greylag geese (Pollitt *et al.* 2003, Barton & Pollock 2004).

In Scotland, the Firth of Forth is one of the most important estuarine areas for wintering birds and is one of the most significant areas along the east coast in terms of species diversity and abundance (May & Law 1997). Slavonian grebe, knot and redshank occur in internationally important numbers, while counts of red-throated and black-throated divers, great crested (*Podiceps cristatus*) and red-necked grebes (*Podiceps grisegena*), scaup, long-tailed duck, common and velvet scoter, goldeneye and red-breasted merganser are of national importance (Barton & Pollock 2004). Eider, oystercatcher, ringed plover, dunlin,

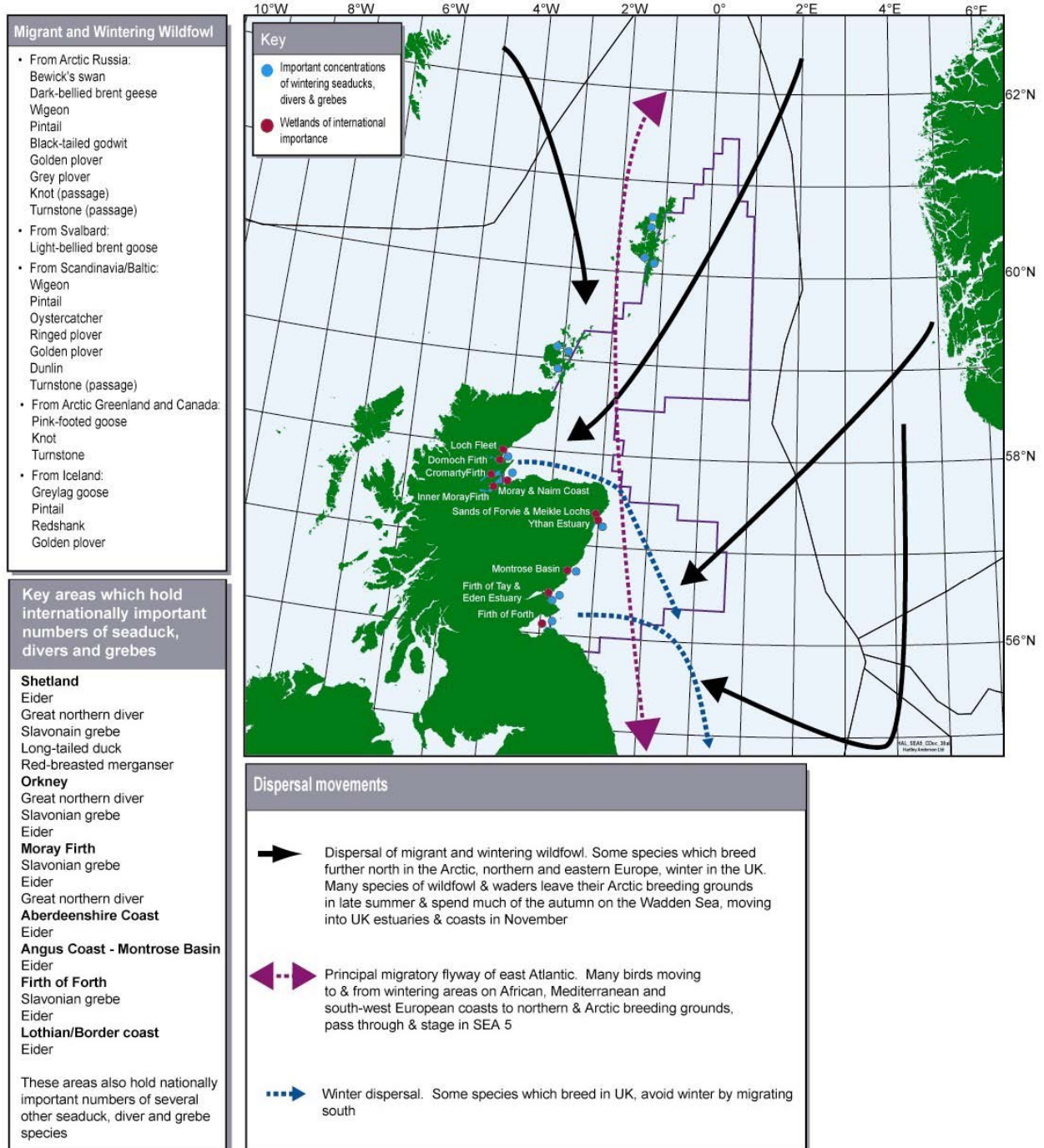
curlew and turnstone also occur in nationally important numbers on the Firth of Forth (Pollitt *et al.* 2003). The sandy bays of the Forth are utilised by roosting waterbirds, and large numbers of waders utilise the extensive intertidal mudflat and salt marsh areas.

Aberlady Bay lies approximately 25km east of Edinburgh on the southern shores of the Firth. It supports regular waders of northern Europe on passage, with many present in winter. As the area is well watched, rarities and scarce migrants are often recorded. These have included little gull (*Larus minutus*) and black tern (*Chlidonias niger*) during autumn, glaucous gull (*Larus hyperboreus*) and jack snipe (*Lymnocyptes minimus*) in winter and a female king eider (*Somateria spectabilis*) during spring/summer for the last seven years. Aberlady Bay also holds internationally important numbers of roosting pink-footed geese, with peak numbers occurring in October and November (Barton & Pollock 2004).

Recent surveys of the Lothian and Border coastline reported total numbers of eider exceeding the UK international importance threshold. Goldeneye regularly occur in nationally important numbers at the Tweed Estuary during winter. The Tweed Estuary also holds internationally important numbers of moulting mute swans between July and September, while Tynninghame Estuary holds nationally important numbers of whooper swan in winter (Barton & Pollock 2004).

The generalised distribution patterns and movements of migratory waterbirds in the SEA 5 area and adjacent waters are summarised in Figure A5.2.

Figure A5.2 - General distribution patterns and movements of migratory waterbirds

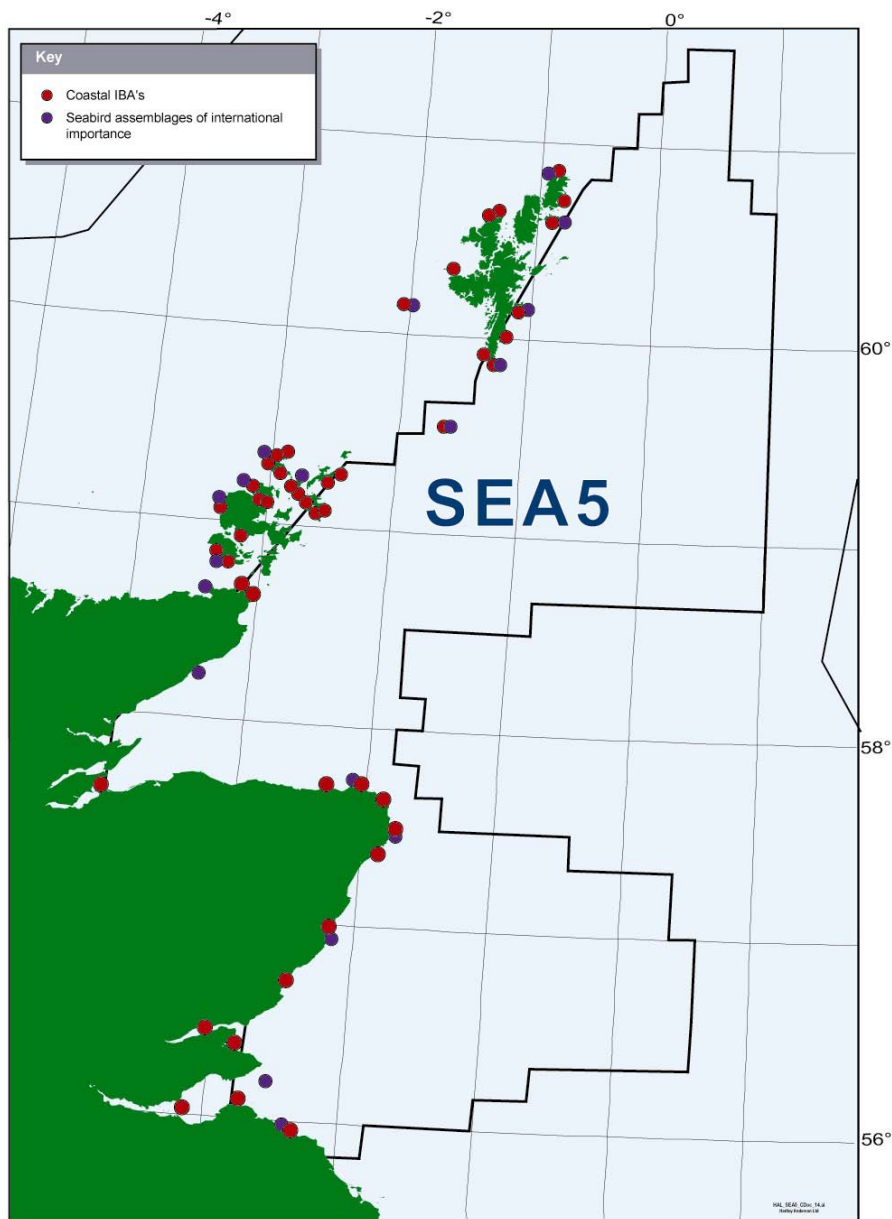


Importance of individual coastal areas

The Important Bird Areas (IBA) Programme of Birdlife International is a non-statutory worldwide initiative aimed at identifying and protecting a network of critical sites for the conservation of the world's birds (Heath & Evans 2000). Within Europe there are legal mechanisms provided by a number of international conventions and initiatives, which protect the ecological integrity of these sites at a variety of geographical scales. However despite a relatively well-developed statutory framework, many IBAs remain without official protection or recognition (Heath & Evans 2000).

There are 149 Important Bird Areas in the UK which regularly support over 20,000 wintering or passage waterbirds, or more than 1% of the biogeographic or flyway population of a waterbird species; 46 IBAs for breeding seabirds; and 20 sites for breeding waterbirds (including gulls and terns) (Heath & Evans 2000). One of the top five most important sites for breeding seabirds (including gulls and terns) is in and adjacent to the SEA 5 area: Caithness Cliffs. Forty-five IBAs are located on the SEA 5 area coastline (Figure A5.3).

Figure A5.3 - Coastal IBAs in the SEA 5 region



IBAs within the SEA 5 area, identified by Heath and Evans (2000) are as follows:

Shetland and Orkney

As IBAs for Shetland and Orkney were previously described in some detail in the SEA 4 consultation document (DTI 2003), only the IBA sites names have been included here (Table A5.6a and A5.6b).

Table A5.6a - IBA sites in Shetland

Site name	Site name
Sumburgh Head	Hermaness, Saxa Vord & Valla Field
Lochs of Spiggie & Brow	Fetlar
Foula	Noss
Papa Stour	Mousa
North Roe & Tingon	Fair Isle
Ramna Stacks & Gruney	

Table A5.6b - IBA sites in Orkney

Site name	Site name
Pentland Firth Islands	East Sanday
South Walls & Switha	North Ronaldsay Coast
Hoy	Auskerry
Marwick Head	Copinsay
Rousay	Faray and Holm of Faray
South Westray Coast	Rothiesholm Peninsula, Stronsay
North Westray Coast	South-Eastern Stronsay
West Westray	Scapa Flow
Papa Westray (North Hill & Holm)	North Mainland Coast
Eday	Sounds around Wyre

East coast of Scotland

- **Caithness Cliffs.** Cliffs regularly support 127,000 pairs of breeding seabirds and 54,000 pairs of breeding waterbirds. Nationally important for breeding fulmar (27,100 pairs, 5% GB population) and cormorant (250 pairs, 3%).
- **Moray Basin, Firths and Bays.** Coastal areas form an integral unit that is internationally important for wintering and passage wildfowl. Regularly holds 130,000 wintering and 31,000 passage wildfowl. Nationally important for breeding cormorant (280 pairs, 4% GB population), wintering cormorant (775 birds 5%), mute swan (380 birds, 1%), pink-footed goose (2,140 birds, 1%), shelduck (1,060 birds, 1%), eider (1,710 birds, 2%), long-tailed duck (3,740 birds,), common scoter (2,760 birds, 7%), goldeneye (975 birds, 3%), goosander (605 birds, 7%), purple sandpiper (260 birds, 1%) and greenshank (8 birds, 1%).
- **Troup, Pennan and Lion Head.** Site regularly holds 38,400 pairs of breeding seabirds and 36,100 pairs of breeding waterbirds. It is nationally important for breeding herring gull (4,200 pairs, 2% GB population) and for one of only two gannet breeding colonies on the UK mainland.
- **Rosehearty to Fraserburgh Coast.** Site is important for wintering waders, including purple sandpiper and turnstone.
- **Loch of Strathbeg.** Site is important for wintering wildfowl and breeding terns and regularly holds 42,800 wintering waterbirds. Site is also nationally important for wintering teal (1,860 birds, 1% of GB population).
- **Buchan Ness to Collieston Coast.** Site regularly holds 23,800 pairs of breeding seabirds and 28,100 pairs of breeding waterbirds. It is nationally important for breeding herring gull (2,960 pairs, 2% GB population), kittiwake (25,000 pairs, 5%) and guillemot (18,700 pairs, 3%).

- **Ythan Estuary, Sands of Forvie & Meikle Loch.** Site is important for breeding seabirds and regularly supports 26,700 wintering waterbirds. Site includes an important goose roost at Meikle Loch. It is nationally important for breeding eider duck (370 pairs, 1% GB population), common tern (175 pairs, 1%), for wintering eider (1,930 birds, 2%) and snow bunting (190 birds, 2%), and for summer moulting assemblages of eider duck (1,210 birds, 2%).
- **Fowlsheugh.** Site regularly holds 52,900 pairs of breeding seabirds and 67,900 pairs of breeding waterbirds. Breeding birds include herring gull, kittiwake, guillemot and razorbill.
- **Montrose Basin.** Site supports large numbers of wintering wildfowl and waders and regularly holds 49,400 wintering waterbirds. Site is nationally important for breeding eider (400 pairs, 1% GB population), for wintering wigeon (4,440 birds, 2%) and eider (1,790 birds, 2%) and for summer moulting assemblages of eider (880 birds, 1%).
- **Firth of Tay.** Site is important for wintering and passage wildfowl and waders and supports several breeding reedbed species. It is nationally important for breeding water rail (125 pairs, 18% GB population) and bearded tit (18 pairs, 4%), and for wintering eider (1,730 birds, 2%).
- **Eden Estuary, Tenstmuir Point and Abertay Sands.** Site supports large numbers of wintering waders and wildfowl and regularly holds 35,100 wintering waterbirds. The site is nationally important for wintering shelduck (1,190 birds, 2% GB population), eider (15,000 birds, 19%), common scoter (1,630 birds, 4%), red-breasted merganser (115 birds, 1%), oystercatcher (4,210 birds, 1%), grey plover (940 birds, 2%), black-tailed godwit (130 birds, 2%) and redshank (1,370 birds, 1%), and for passage, grey plover (735 birds, 2%), red-breasted merganser (130 birds, 2%) and redshank (1,320 birds, 1%).
- **Firth of Forth.** Site regularly holds 82,100 wintering and 28,600 passage waterbirds and is nationally important for wintering great crested grebe (655 birds, 6% GB population), cormorant (710 birds, 5%), teal (1,570 birds, 1%), eider (7,550 birds, 10%), long-tailed duck (710 birds, 3%), common scoter (2,650 birds, 7%), goldeneye (2,300 birds, 7%), red-breasted merganser (610 birds, 6%), oystercatcher (8,650 birds, 2%), ringed plover (355 birds, 1%), grey plover (665 birds, 2%), for passage, oystercatcher (8,200 birds, 2%), ringed plover (470 birds, 2%) and grey plover (565 birds, 1%), and for summer moulting assemblages of eider (5,950 birds, 8%).
- **Forth Islands.** Site regularly holds 84,700 pairs of breeding seabirds and 32,500 pairs of breeding waterbirds. It is nationally important for breeding eider (1,660 pairs, 5% GB population), kittiwake (9,900 pairs, 2%) and Arctic tern (540 pairs, 1%).
- **St. Abb's Head to Fast Castle.** Site regularly holds 23,200 pairs of breeding seabirds and 21,600 pairs of breeding waterbirds. It is nationally important for breeding cormorant (305 pairs, 4% GB population) and kittiwake (19,800 pairs, 4%) and for wintering eider (1,210 birds, 2%).

A review of thirteen species of diver, grebe and seaduck distribution and abundance in the SEA 5 area, was conducted and published by Cork Ecology at the request of the Department of Trade and Industry as part of the SEA 5 process (Barton & Pollock 2004). The objectives of the review were to assess the existing knowledge of the distribution and abundance of thirteen species of divers, grebes and seaducks in the SEA 5 areas, to identify gaps in existing knowledge and to recommend further work to address any gaps identified.

This review described the eight most important regions within the SEA 5 area for species of diver and grebe (Table A5.7a).

Table A5.7a - Estimated totals of selected divers and grebes for eight principal regions in the SEA 5 area.

Area	Red throated diver	Black throated diver	Great northern diver	Great crested grebe	Red necked grebe	Slavonian grebe
National threshold	49	7	30	159	2	7
International threshold	10,000	10,000	50	4,800	1,000	35
Shetland	99	-	415	-	-	90
Orkney	71	58	1,073	-	17	133
Moray Firth	142	22	48	1	2	74
Aberdeenshire coast	315	2	14	-	-	-
Angus coast	124	2	-	28	-	-
Tay/St. Andrews	78	-	-	-	-	29
Firth of Forth	83	8	5	399	49	70
Lothian/Borders	-	4	-	-	-	-
Minimum estimate for SEA 5 area	912	96	1,555	428	68	396
% GB Total in SEA 5 area	18.8	13.7	51.8	2.7	34.0	60.9

Notes: Blue: Nationally important – winter, Yellow: Internationally important – winter, Orange: nationally important – summer, Green: internationally important – summer

The international and national importance of these areas for seaduck were also described in this review and details can be found in Table A5.7b below.

Table A5.7b - Estimated totals of selected seaducks for eight principal regions in the SEA 5 area.

Area	Scaup	Eider (winter)	Eider (summer)	Long-tailed duck	Common scoter	Velvet scoter	Goldeneye	Red-breasted merganser
National threshold	76	730	730	160	500	30	249	98
International threshold	3,100	750	750	20,000	16,000	10,000	4,000	1,700
Shetland	-	-	5,700	1,750	-	-	600	650
Orkney	-	3,493	-	3,431*	-	96	268	605
Moray Firth	671	1,317	-	2,967	4,353	1,262	1,258	361
Aberdeenshire coast	17	1,475	3,502	118	3,118	398	-	371
Angus coast	42	2,544	2,384	290	959	578	-	122
Tay/St. Andrews	195	8,258	-	492	1,557	1,211	103	251
Firth of Forth	471	5,841	7,690	811	1,915	633	2,915	614
Lothian/Borders	-	1,884	-	-	-	-	482	-
Minimum estimate for SEA 5 area	1,396	24,812	21,660	9,859	8,891 Winter	3,202 Winter	5,626	2,230 Winter
% GB Total in SEA 5 area	18.4	34.0	29.6	61.6	17.8	100	22.6	22.7

Notes: Blue: Nationally important – winter, Yellow: Internationally important – winter, Orange: nationally important – summer, Green: internationally important – summer, * Incomplete count

Of the thirteen species of diver, grebe and seaduck species looked at, all occur in nationally important numbers within the SEA 5 area. Numbers of eider are internationally important throughout the year while great northern divers and slavnain grebes occur in internationally important numbers in winter (Barton & Pollock 2004).

Sensitivities and vulnerability – seabirds

UK breeding population trends in seabird species was reviewed by Mavor *et al.* (2003) and more recently by Mitchell *et al.* (2004). Over the last 30 years the numbers of seabirds breeding in Britain and Ireland has risen steadily from around 5 million (1969-1970) to over 8 million (1998-2002) (Mitchell *et al.* 2004). Breeding population size is most affected by factors that influence adult survival and these include senescence, disease, reduced food availability, predation, hunting/culling and stochastic events such as oil spills and severe storms (Mitchell *et al.* 2004). Eleven of the twenty-one seabirds studied¹ have shown a decrease (Table A5.8).

Table A5.8 - % change in breeding seabird numbers in the UK from SCR Census (1985-1988) to Seabird 2000 (1998-2002)

Species	Trend	% Change since SCR Census (1985-1988)
Fulmar	↓	-3%
Gannet	↑	40%
Great skua	↑	26%
Black-headed gull	=	0%
Lesser black-backed gull	↑	41%
Great black-backed gull	↓	-3%
Kittiwake	↓	-25%
Sandwich tern	↓	-15%
Little tern	↓	-24%
Guillemot	↑	31%
Black guillemot	↑	3%
Arctic skua	↓	-37%
Storm petrel	?	-
Common tern	↓	-17%
Manx shearwater	?	-
Cormorant	=	0%
Shag	↓	-25%
Razorbill	↑	22%
Herring gull	↓	-12%
Roseate tern	↓	-83%
Arctic tern	↓	-31%

Source: Mitchell *et al.* 2004

¹ Manx shearwater, storm petrel and Leach's storm petrel have not been included here as Seabird 2000 is the first comprehensive baseline population estimate for these, therefore a comparison with SCR is not available.

Food and fisheries

Commercial fisheries do not always compete with seabirds over fish, and in fact fishing trawlers are an important source of food for species such as fulmar, kittiwake, gannet, herring gull and great black-backed gull, all of which scavenge at trawlers. Since the 1970s there has been a general decline in commercial fishing around Britain. This, combined with changes in fishing practice (i.e. reduced mesh sizes resulting in fewer fish discards and the retention of fish offal for conversion to fish meal) has led to an overall reduction in food available to seabirds. Following the recent collapse of the white fish stocks in the North Sea, the amount of food for seabirds provided by fishing is set to decline even further in the future (Mitchell *et al.* 2004).

The collapse of the sandeel stocks around Shetland in the mid-1980s and poor stocks in recent years has had detrimental effects on seabirds which rely on sandeels. In 2003, Shetland recorded the worse breeding success for kittiwakes anywhere in Britain and had the worse season in the 25 years since monitoring began there, with many birds not attempting to breed and of those which did only around half went on to lay with very few chicks hatching. The extent to which fishing has affected the availability of small prey fish like sandeels remains poorly understood. While the sandeel collapse of the 1980s has been attributed to changes in oceanography rather than the effect of fishing, a precautionary ban was imposed on the Shetland fishery in the period 1990-1995 and subsequent catches have been limited to low levels. A ban has been imposed in the eastern North Sea since 2000, with reopening dependant on kittiwake success (Mitchell *et al.* 2004).

Generally, monofilament gillnets are the type of fixed fishing gear that produces the largest bycatch of birds (Tasker *et al.* 2000). Impacts of seabird bycatch in waters around Britain tend to be localised, with “hot spots” found where nets are set in the vicinity of colonies rather than widespread occurrence. Virtually all types of fishing gear, if used in zones in which seabirds feed, may catch birds, (e.g. guillemots have been recorded in sandeel trawls in the North Sea when used in feeding areas of a colony) (Tasker *et al.* 2000).

Compared to other methods of fishing such as bottom trawling, longline fishing is better insofar that it: is better at catching target species, tends to take older more mature individuals while avoiding juveniles and takes a smaller bycatch. However, there is evidence that longline fisheries inflict mortality on pelagic seabirds, by snaring and drowning them as they try to intercept and consume bait from hooks before they sink (Dunn & Steel 2001). Research in the southern hemisphere has suggested that mortality as a result of longline fisheries is responsible for the decline of certain albatross species and there is now international pressure to develop technical solutions for reducing this incidental mortality.

Longline fishing is a growing industry off Norway and Britain and the relatively small amount of data which has been collected so far suggests that mortality, as a result of longline fisheries, is also occurring in these waters. The Norwegian studies have shown that 99% of birds caught in this way are fulmars and the Norwegian fleet is estimated to take ca. 20,000 annually. However this estimate is conservative and numbers may actually be as high as between 50,000 and 100,000. The longline fleets of Iceland and the Faroes are also estimated to take considerable numbers of fulmar in their regional waters. Although fulmars are caught in significant numbers, the estimated annual mortality is not thought to be status threatening for this species. Nonetheless, a considerable number of mitigation measures designed to reduce this bycatch of seabirds have been recommended, including setting lines at night, trailing bird scaring lines and streamers behind vessels during line setting, using machines to cast bait clear of the vessels wake during line settling, weighting lines more heavily so their descent is more rapid, closing fishing areas or seasons and not dumping offal near fishing lines during setting and hauling (Dunn & Steel 2001).

Offshore windfarms

Finding and harnessing renewable energy sources is paramount if greenhouse gas emissions are to be reduced. While there are a growing number of operational terrestrial windfarms in the UK, offshore windfarms, operational or in development, are still few in number. The second round of licensing for offshore wind farm proposals has been completed with sites in the northwest of England, the Greater Wash and the Thames Estuary being awarded licences (British Wind Energy website <http://www.offshorewindfarms.co.uk/>). No offshore sites in Scottish waters were granted licences in the first or second licensing round.

As offshore windfarms are a fledgling industry in the UK and projects in the UK are generally larger than those found elsewhere in Europe (e.g. Norway and Denmark), data on potential impacts on birds from UK development is both scarce and difficult to compare with smaller European developments. As yet, in the UK, major adverse effects on birds associated with windfarms have yet to be recorded (RSPB 2004). However, though many are being proposed, few large wind farms have yet to be constructed offshore and the effects, if any, on birds would need to be recorded so that potential impacts can be fully understood and addressed.

To date, available evidence suggests that appropriately positioned windfarms do not pose a significant hazard for birds, on the proviso that developments are carefully sited, designed and managed carefully to ensure problems do not arise (RSPB 2004). The main potential hazards to birds from offshore windfarms include: mortality following collision with turbines, loss of habitat with birds being disturbed and moving away from traditional areas/nest sites/feeding areas and turbines creating a barrier between feeding and/or roosting areas and migration routes. These and other potential impacts could arise during specific phases of the development (pre-installation exploration; construction, including cable installation; operation; maintenance and de-commissioning) and all may have impacts on bird species in the surrounding area (Barton & Pollock 2004).

Pollution and oil and gas activities

Pollution of the sea by oil, predominantly from merchant shipping can be a major cause of seabird mortality. Although locally important numbers of birds have been killed on the UKCS directly by oil spills from tankers, population recovery has generally been rapid. In the last 15 years the largest spill in the SEA 5 area was the *Braer* (Shetland, January 1993). While this spill resulted in the death of many birds, the impact of the spill was far less than if it had occurred during the breeding season, when many birds would have been at and near colonies. During the non-breeding season many species disperse away from the colonies.

Little or no direct mortality of seabirds has been attributed to exploration and production activities on the UKCS. However, Weise *et al.* (2001), claimed that mortality had been documented due to impact on the structure, oiling and incineration by the flare, of seabirds aggregated around oil drilling platforms and rigs in above average numbers due to night lighting, flaring, food and other visual cues. These sources of mortality it was conjectured could, following offshore hydrocarbon development in the northwest Atlantic (i.e. the Grand Banks), affect both regional and global breeding populations. However, based on North Sea seabird colony performance this scale of effect seems unfeasible.

In response to the observations of flocks of migrating birds occasionally entering the flare during testing, the Nederlandse Aardolie Maatschappij b.v (NAM), an oil and gas exploration and production company, began researching bird behaviour in connection with offshore installations. They have found that mortality due to flaring is a rare event but can potentially

involve a high number of migratory birds. Although the frequency of birds being killed by flares appears very low, the risk of flaring can be managed by either restricting flaring to daylight hours or if this is not possible appointing a bird watcher for the nightly period who has the authority to stop flaring when the risks of burning become too high (Marquenie & van de Laar 2002).

Light at sea however, has a much higher potential for impact. The behaviour of songbirds, ducks and waders differs in the period between midnight and sunrise during periods of >90% cloud cover to that seen when there is less or no cloud cover. Under >90% cloud cover conditions large flocks of migratory songbirds can become attracted to the work lights and flares of platforms. To reduce the impact of lights, mitigation measures include turning off lights whenever possible to do so without compromising safety or dimming to a large extent. This has already been tested on an installation in the coastal zone of the island Ameland, with plans for other offshore platforms being developed (Marquenie & van de Laar 2002).

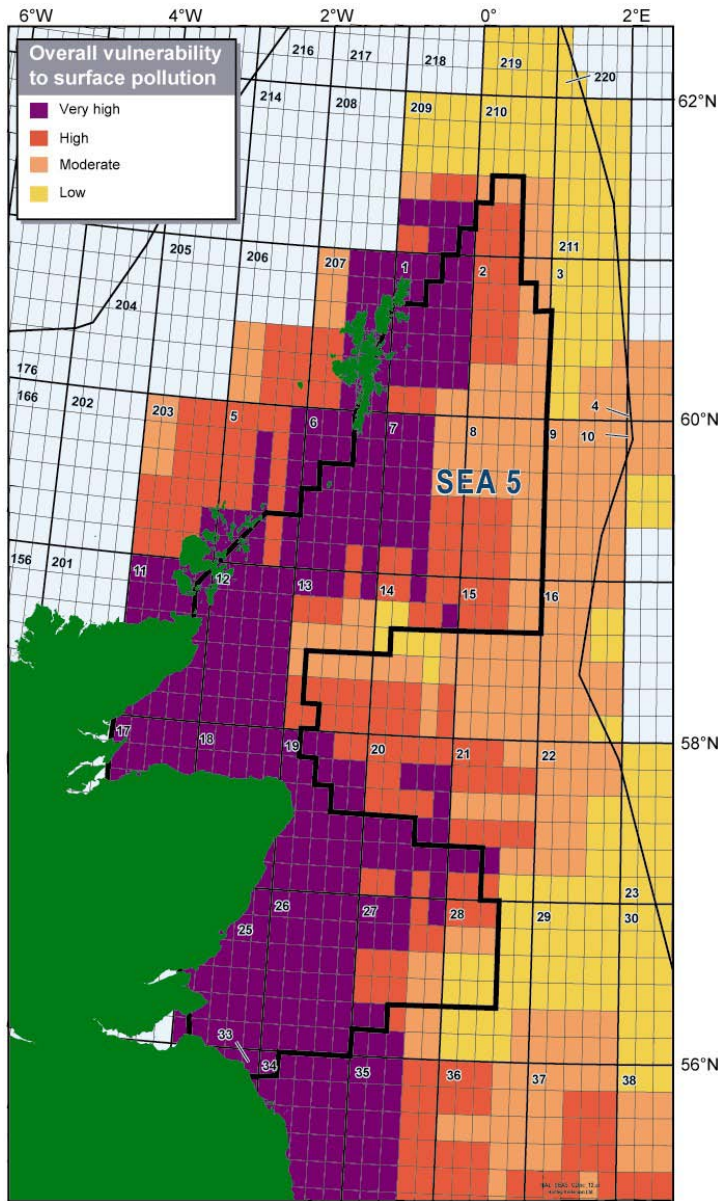
Chronic pollution resulting from illegal dumping or tank washing probably has a greater impact on seabirds than accidental spills from shipping casualties (e.g. Andrews & Standing 1979). Beached bird surveys around the UK (Stowe & Underwood 1983) and elsewhere in Europe (e.g. Vauk 1984), provide useful data on the risks to seabirds of oil pollution in the North Sea.

The vulnerability of seabird species to oil pollution at sea is dependant on a number of factors and varies considerably throughout the year. The Offshore Vulnerability Index (OVI) developed by JNCC and used to assess the vulnerability of bird species to surface pollution considers four factors:

- the amount of time spent on the water
- total biogeographical population
- reliance on the marine environment
- potential rate of population recovery (Williams *et al.* 1994)

Of the species commonly present offshore in the SEA 5 area (see species accounts above), gannet, skuas and auk species are the most vulnerable to oil pollution due to a combination of heavy reliance on the marine environment, low breeding output with a long period of immaturity before breeding and the regional presence of a large percentage of the biogeographic population. In contrast, the aerial habits of the fulmar and gulls, together with large populations and widespread distribution, reduce vulnerability of these species.

Figure A5.4 - Overall Vulnerability of seabirds to surface pollution



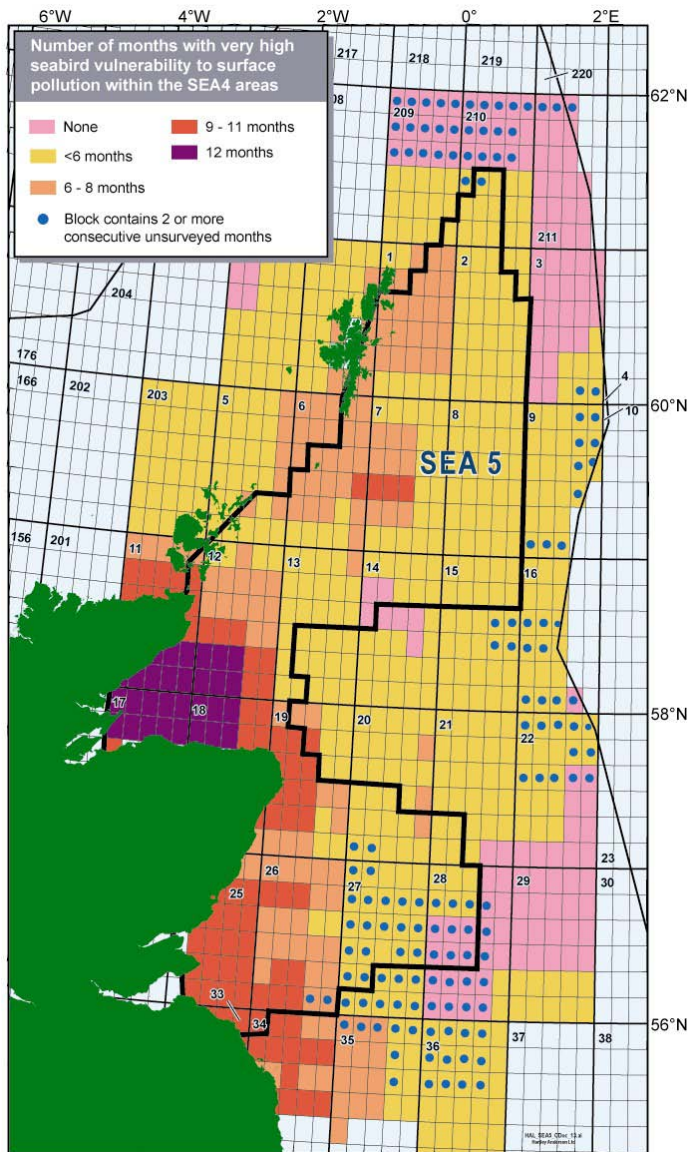
Vulnerability scores for individual UKCS licence blocks have been calculated by JNCC, and smoothed seabird vulnerability maps are published by BODC (1998). Overall vulnerability to surface pollutants (taking seasonal variability into account); seasonality (expressed as number of months in which very high vulnerability occurs) and data gaps (defined as blocks for which two or more consecutive months are unsurveyed) are shown in Figures A5.4 and A5.5.

Overall, vulnerability of seabirds to surface pollution is very high in all blocks of Quadrants 11, 12, 17, 18, 25 and 26 (north of the Scottish mainland and along the whole east coast of Scotland), however, Quadrants 11, 17, 18 and 25 do not contain the full 30 blocks as they abut the coastline. All of the blocks, within these Quadrants, which are applicable (i.e. those at sea), are designated very high vulnerability.

Much of the seabird vulnerability is associated with proximity of breeding colonies and post-breeding dispersal of auks and is

therefore seasonal. Vulnerability is very high for between 6 and 8 months of the year in some blocks of Quadrants 207, 1, 5, 6, 7, 12, 13, 19, 20, 25 and 26 and for between 9 and 11 months in some blocks of Quadrants 6, 7, 11, 12, 17, 18, 19, 25, 26, 33 and 34, while remaining blocks within Quadrants in the SEA 5 area are highly vulnerable for less than six months; i.e. had operational windows within which vulnerability is lower.

Figure A5.5 - Seasonal vulnerability of seabirds to surface pollution (expressed as numbers of months in which very high vulnerability is present, data gaps for seabird vulnerability are also shown)



Vulnerability data are relatively adequate for most of the SEA 5 area, with the exception of the most northern region and the oil and gas fields area of the central North Sea region. However, data gaps are present for two or more consecutive months in parts of Quadrants 210, 20, 26, 27 and 28. Much of the available information dates from SAST work in the early 1980s (principally SAST 2 between 1983 and 1986) and it is possible that significant ecological change has occurred since then, as is known for plankton distribution (Beaugrand *et al* 2002). In 1999 JNCC produced a report that aimed to provide a more comprehensive analysis of variability in SAST seabird dispersion data and its consequences.

From studies in the Irish Sea they found that many studies reported seabirds associated with fronts and surrounding bodies of water. Fronts are regions of enhanced biological productivity, which occur where tidally mixed waters converge with seasonally stratified waters. Species were found to utilise frontal areas differently with guillemots favouring the surface expression and the warm side of the front, razorbills preferring colder mixed water and Manx

shearwater preferring the warm side of the front (O'Brian *et al.* 1999). The relationship between foraging predators and a front remains difficult to detect, however fronts may have major influences on the spatial and temporal variability in seabird densities and require further investigation.

This report concluded that for areas of the North Sea at least, seabird densities for low-density areas can be confidently predicted while for predicting densities of high density it is necessary to be more cautious, due to the intrinsically greater variability associated with high densities.

Sensitivities and vulnerability – coastal waterbirds

The major breeding areas for most wildfowl and wader species are outside the UK (in the high Arctic for many species), therefore population dynamics are largely controlled by factors outwith the scope of SEA 5 – including breeding success (largely related to short-term

climate fluctuations, but also habitat loss and degradation) and migration losses. Other significant factors include lemming abundance on arctic breeding grounds (a major competitor for food for white-fronted geese). Variability in movements of wintering birds, associated with winter weather conditions in continental Europe, can also have a major influence on annual trends in UK numbers, as can variability in the staging stops of passage migrants.

The Government published the White Paper: Achieving a better quality of life in 1999, which contained a draft of 150 indicators of the sustainability of lifestyles in the UK. Of these 150, 15 were identified as “headline” indicators and one of these was based on population trends of breeding birds. The wild bird indicator is based on an average trend across species, calculated on a geometric scale and with missing data imputed. The indicator summarises information on the status of more than 100 commoner breeding species over the last 30 years (RSPB website <http://www.rspb.org.uk>). This approach has been applied to wintering waterbirds to produce a waterbird indicator for 33 species.

Populations of some wintering waders and wildfowl have shown steady increases since the 1970’s, the reason for which is believed to coincide with a better recognition of the value and hence the protection of wetlands for wildlife (Gregory *et al.* 2003). However, since a peak in 1996-97, there have been short term declines in numerous species resulting in a downward trend in the indicator itself. There are various reasons for the decline of these species and some remain unknown.

Table A5.9 - Long term population trends of wintering waterbirds

Species	*Long-term trend	**Short-term trend	Species	*Long-term trend	**Short-term trend
European white-fronted goose	↓	↓	Shoveler	↑	↑
Bar-tailed godwit	↓	↓	Curlew	↑	↑
Mallard	↓	↓	Pintail	↑	↓
Knot	↓	↑	Mute swan	↑	↑
Pochard	↓	↓	Greenland barnacle goose	↑	↑
Dunlin	↓	↓	Teal	↑	↑
Shelduck	-	↓	Whooper swan	↑	↑
Ringed plover	↑	↓	Pink-footed goose	↑	↑
Turnstone	↑	↓	Black-tailed godwit	↑	↑
Sanderling	↑	↑	Grey plover	↑	↑
Icelandic greylag goose	↑	↓	Svalbard barnacle goose	↑	↑
Red-breasted merganser	↑	↑	Canada goose	↑	↑
Tufted duck	↑	↑	Gadwall	↓	↑
Goldeneye	↑	↑	Re-established greylag goose	↓	↑
Oystercatcher	↑	↓	Coot	N/A	↑
Wigeon	↑	↑	Great crested grebe	N/A	↑
Goosander	↑	↓	Greenland white fronted goose	N/A	↑
Redshank	↑	↑			

Source: Gregory *et al.* 2003.

Note: *Long term trends are % changes between winters 1970/71 and 2000/2001; **Short term trends are % changes between winters 1990/91 and 2000/2001. National monitoring of coot, great crested grebe and Greenland white-fronted goose started later than for other species and only short term trends are shown.

The numbers of bar-tailed godwit, turnstone and ringed plover continue to decline and the latter two species are known to be declining on non-estuarine coasts too. The decline of bar-tailed godwit has been evident since the mid 1980s, with numbers recorded by WeBS during 2000-01 at an all time low. The UK populations of oystercatcher, knot and redshank have remained relatively stable over the last ten years, while black-tailed godwit numbers may be levelling off (Gregory *et al.* 2003).

Population status of birds in the UK

Of the twenty-three species which have moved from the green to the amber list of conversation concern, four are seabirds (fulmar, cormorant, black-headed gull and kittiwake) and two are waterbirds (mute swan and long-tailed duck), under the definitions used in this report. Declines are either at a local level or in context of international numbers.

The WeBS Alerts System has been developed to provide a standardised method of measuring and reporting on changes in wintering waterbird numbers at different temporal and spatial scales using Wetland Bird Survey (WeBS) data. Alerts are triggered for populations that have undergone major declines and are intended to help identify where research into causes of decline may be needed and inform conservation management (BTO website). Declines for whooper swan, goldeneye, red-breasted merganser, goosander, coot, knot, bar-tailed godwit and redshank in Scotland, have all been in contrast to the trends of the United Kingdom as a whole, whereas numbers of little grebe, teal, grey plover, sanderling and black-tailed godwit have all shown substantial increases (BTO 2004).

In Scotland, high alerts² have been triggered for whooper swan and pochard, while medium alerts have been triggered for pintail, goldeneye, red-breasted merganser, goosander, coot, grey plover, knot, dunlin, bar-tailed godwit, redshank and turnstone.

² Details of how alerts are calculated can be found in Austin *et al.* 2004. Declines of greater than 50% are flagged as high alerts and declines of 25-50% inclusive are flagged as medium alerts.

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