

# Important Bird Areas: Breeding seabirds on the Isles of Scilly

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Razorbills *Alca torda*

*Ren Hathway*

**ABSTRACT** The Isles of Scilly are long famous for attracting rare migrant birds, and much-visited in spring and autumn by those in search of them, but it is much less widely appreciated that the islands also support an outstanding and internationally important assemblage of breeding seabirds. We document the present status and distribution of seabirds on the islands, set populations in their regional, national and international contexts, and review recent and historical changes in numbers. In the light of some alarming population trends, we discuss the possible roles of persecution, disturbance, predation, habitat change, waste and fisheries management, climate change and pollution in bringing about these changes. Finally, we identify a range of actions that we believe will do much to improve the fortunes of the seabirds breeding in the archipelago.

The Isles of Scilly are situated some 45 km to the west of the southwest tip of the British mainland. Five inhabited islands and at least 300 smaller, uninhabited islands, islets and rocks cover a total area of 16 km<sup>2</sup>. Composed primarily of granite, the island group is perhaps best visualised as an island Dartmoor or Bodmin Moor, with the lowest levels now flooded by the sea. The open landscape is a result of forest clearance for arable cultivation, which commenced with the settlement of Scilly in the early Bronze Age, just over 4,000 years ago (Ratcliffe & Straker 1996). The islands are dominated by grass and heathland species, while the littoral fringe varies from low cliffs and rugged rock exposures to sheltered bays and sandflats. Technically, the islands are the sole European example of a Lusitanian<sup>1</sup> semi-oceanic archipelago (UK Biodiversity Steering Group 1995). A modern account of the archipelago's natural history is provided by Parlow (2007).

The islands support a greater diversity of breeding seabirds than any other island group or mainland site in England, with over 9,100 pairs of up to 14 species. They support internationally important populations of European Storm-petrel *Hydrobates pelagicus* [hereafter 'Storm-petrel'] and Lesser Black-backed Gull *Larus fuscus* and nationally important populations of Shag *Phalacrocorax aristotelis* and Great Black-backed Gull *L. marinus*. The populations of a further six species (seven if Roseate Tern *Sterna dougallii* is included) are regarded as important in a southwest regional context. The greater part of the seabird interest is contained within 14 Sites of Special Scientific Interest (SSSI)<sup>2</sup>, the Isles of Scilly Special Protection Area (SPA) and Ramsar Site, and the Isles of Scilly Important Bird Area (IBA)<sup>3</sup>. Much of the area is also a Special Area of Conservation (SAC).

#### *A history of seabird censusing on the islands*

As this archipelago is of such considerable

seabird interest, it is not surprising that many of the older county avifaunas refer to the presence of seabirds in some numbers. However, few of the references are quantitative and information on the size of seabird colonies on Scilly prior to the Operation Seafarer surveys of 1969–70 is scant. We have gathered information from all published (and some unpublished) sources known to us (see reference list), with Penhallurick (1969), Allen (1976), Chown & Lock (2002), Robinson (2003) and Flood *et al.* (2007) providing particularly useful overviews of historical information.

The most recent survey took place in 2006 and formed part of the *Action for Birds in England* programme, a partnership between Natural England and the RSPB, and was conducted in collaboration with the Isles of Scilly Wildlife Trust (IOSWT) and the Isles of Scilly Bird Group. All islands believed to be capable of supporting breeding seabirds were searched during the survey using standard methods (see Gilbert *et al.* 1998). The actual count units used varied between species in strict accordance with these methods. For simplicity, however, all are expressed here as 'pairs', including uncorrected counts of individual auks. The two most recent surveys (2006 and the 1998–2002 Seabird 2000 surveys) used identical methods, were organised by the same team and many of the surveyors, including the authors, were involved in both surveys. The results are thus directly comparable.

#### *The status of seabirds on Scilly in 2006*

A total of 9,161 pairs of 14 species of seabird were recorded from 58 islands in 2006 (see table 1).

The seabird assemblage is dominated numerically by gulls, which are also among the most widespread seabirds in the islands. Numbers of both Lesser Black-backed and Great Black-backed Gulls exceed 1% of the national total. Furthermore, since Lesser Black-backed Gulls breeding in Britain constitute about 65% of the global population of the sub-

<sup>1</sup> Denoting flora or fauna characteristically found only in the warm, moist, west-facing coastal regions of Portugal, Spain, France, and the west and southwest coasts of Great Britain and Ireland.

<sup>2</sup> Not all SSSIs in the archipelago support breeding seabirds and an additional three SSSIs between them support ten pairs of Herring Gulls *L. argentatus*.

<sup>3</sup> The population of wintering Turnstones *Arenaria interpres* additionally forms part of the qualifying interest of the Isles of Scilly IBA (Heath *et al.* 2000). Numbers were estimated at 940 individuals in winter 1984/85, but had fallen to some 330 individuals by winter 1997/98 (Rehfishch *et al.* 2003). As there has been no more recent census, the focus of this paper is on the IBA's seabirds.

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species *graellsii*, the Scilly population is regarded as internationally important. Lesser Black-backed Gull is thus a key species for which the SPA has been designated. Its overall numbers in the archipelago represent some 36% of the total numbers of birds in the assemblage. The regional significance of the Scilly populations of both these species is exceptional.

Numbers of two other species exceed 1,000 pairs. The archipelago is the only place in England where Storm-petrels breed; the population of this Annex 1 species exceeds 1% of the national total and is thus of international importance. The number of breeding Shags represents half the southwest total, a third of the English total and is also of national significance, there being nearly 5% of the British total in the islands; the Scilly colony is the third-largest in Britain, after Foula (Shetland) and the Farne Islands (Northumberland).

The remaining species are much less numerous but nonetheless important: the islands are one of only two nesting stations for Manx Shearwater *Puffinus puffinus* in England (the other being Lundy, Devon). Numbers of both Razorbill *Alca torda* and Common Tern *Sterna hirundo* are large in a regional context, the tern population being one of only three in southwest England. The Fulmar *Fulmarus glacialis* population is of some regional

importance but is expanding rapidly and may assume greater significance in the future. The Puffin *Fratercula arctica* population is of great regional importance and, along with colonies in the Channel Islands and Co. Kerry, marks the southwestern limits of the species' Eurasian breeding range.

*The current distribution of seabirds within the archipelago*

Scilly's breeding seabirds are not evenly distributed: many islands are too small or low-lying to offer shelter from Atlantic storms and even some relatively sheltered islands are regularly washed over on spring tides. The inhabited islands are also scarcely used by breeding seabirds. For example, in 2006, the only species to nest on St Mary's (the largest island, with a coastline of more than 15 km) was Herring Gull, three pairs nesting on rooftops in Hugh Town. This is by far the most widespread species on the inhabited islands, and a further 87 pairs bred on Tresco, 25 on Bryher, 15 on St Agnes and 13 on St Martin's. The remaining seabird interest on the inhabited islands is focused on four areas (figures in parentheses refer to number of pairs nesting in 2006): the Daymark, St Martin's (46 Fulmar, 15 Kittiwake *Rissa tridactyla*, four Lesser Black-backed Gull, three Great Black-backed and 12 Herring Gull);

**Table 1.** Seabirds on the Isles of Scilly, ranked by their abundance in 2006, and showing regional, national and international importance. For scientific names of species, see text. The highest level at which numbers are significant is indicated in bold; an asterisk denotes numbers of international importance.

	no. pairs	no. occupied islands	no. pairs as % of SW regional total	no. pairs as % of English total	no. pairs as % of British total
Lesser Black-backed Gull	3,335	25	44.6	4.7	2.7*
European Storm-petrel	1,398	11	100	100	5.5*
Shag	1,296	28	51.3	33.6	4.9
Great Black-backed Gull	901	38	62.7	58.9	5.4
Herring Gull	715	43	4.2	1.2	<1
Razorbill	342	14	<b>18</b>	3	<1
Fulmar	279	19	<b>11.4</b>	4.4	<1
Kittiwake	266	5	7.7	<1	<1
Puffin	174	8	<b>90.2</b>	<1	<1
Manx Shearwater	171	6	<b>46.6</b>	46.6	<1
Common Guillemot	155	3	<1	<1	<1
Common Tern	78	6	<b>21.6</b>	1.6	<1
Great Cormorant	50	4	3.7	1.2	<1
Sandwich Tern	1	1	<1	<1	<1
<i>Total</i>	<i>9,161</i>	<i>58</i>			

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Wingletang Down, St Agnes (eight Manx Shearwater and four Herring Gull); Shipman Head/Shipman Head Down, Bryher (13 Fulmar, 13 Manx Shearwater, four Shag, six of both Great and Lesser Black-backed Gull, and 11 Herring Gull); and Gimble Porth, Tresco (37 Kittiwake, four Lesser Black-backed Gull and 54 Herring Gull). All four areas are within SSSIs and, with the exception of Wingletang Down, are part of the SPA.

The principal seabird interest of the archipelago is, however, largely concentrated within six key islands or island groups:

*Annet*

This small island is of outstanding importance for breeding seabirds, supporting 1,638 pairs of ten species in 2006, some 18% of the total in the archipelago. It is low-lying and of gentle relief throughout, and is covered by large expanses of maritime grassland, a prominent element of the sward being either Thrift *Armeria maritima* or Bracken *Pteridium aquilinum*. The grassland supports the bulk of the gulls and burrow-nesting Manx Shearwaters and Puffins. Impressive storm beaches provide nesting grounds for many of the island's Storm-petrels,

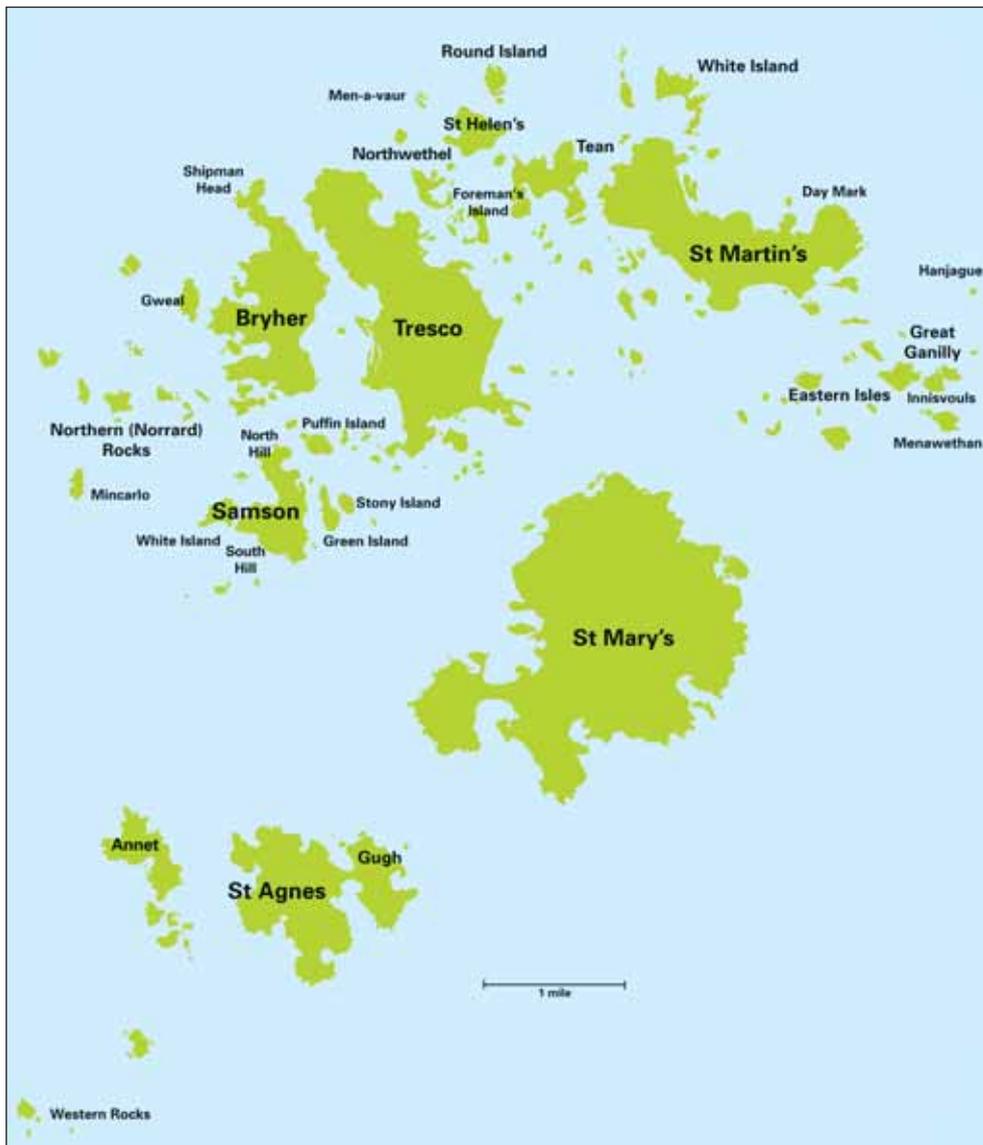


Fig. 1. The Isles of Scilly.

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208. The Eastern Approaches, a familiar site to those who travel to Scilly by air. Seen here are Menawethan (foreground), Great Innisvoul (middle distance) and Great Gannilly (far left) in the Eastern Isles, with Chapel Down and the Daymark, St Martin's, in the background; July 2000.

**Table 2.** A summary of the status of the seabirds breeding on Scilly. This shows the number of breeding pairs in 2006, the % change since 1999–2000, when the SPA was classified, and longer-term trends.

	2006	change since 1999–2000	longer-term trends
Fulmar	279	+52%	Rapid increase in numbers continues since first breeding in 1951
Shag	1,296 <sup>1</sup>	+17%	Apparent stability
Razorbill	342	+16%	Recent increase after earlier massive decline
Great Black-backed Gull	901	+12%	Recent upturn after a general decline (down 43% since the mid 1970s)
Puffin	174	+4%	Recent increase since the 1980s, following earlier massive decline
Sandwich Tern	1	n/a	An occasional breeder for much of the time since 1880
European Storm-petrel	1,398 <sup>1</sup>	-5%	Numbers appear relatively stable, though possibly a slight decrease <sup>2</sup>
Kittiwake	266	-5%	Rapid decline continues, by 70% since 1983
Lesser Black-backed Gull	3,335 <sup>1</sup>	-8%	Slow decline continues, by 18% since peak of 4,050 pairs in 1983
Great Cormorant	50	-11%	Apparent stability
Manx Shearwater	171	-15%	Apparent recent decrease <sup>2</sup>
Common Tern	78	-19%	A regular breeder since the 1940s at least; numbers peaked 1983 with steady decline since
Common Guillemot	155	-21%	Recent decrease following a steady rise in numbers (numbers have tripled since 1969) after an earlier massive decline
Herring Gull	715	-21%	Steep decline continues – by 68% since 1974

<sup>1</sup> Represents >10% of overall breeding assemblage (Great Black-backed Gull now 9.8%).

<sup>2</sup> Long-term trends not known with certainty as earlier surveys used methods which are not comparable or no surveys conducted.

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while the fringe of low cliffs supports most of the remaining birds. The island's populations of Manx Shearwater (89 pairs) and Storm-petrel (788 pairs) each exceed just over half the archipelago total, while the populations of Great Black-backed Gull (187 pairs, 21% of the archipelago total) and Puffin (50 pairs, 29% of the archipelago total) are also notable. There are also large numbers of Shag (177 pairs) and Lesser Black-backed Gull (281 pairs) and small numbers of Fulmar (37 pairs), Herring Gull (24 pairs) and Razorbill (four pairs). Terns nest here occasionally, and one pair of Common Terns did so in 2006. The island is an SSSI in its own right and lies within the SPA.

#### Samson

Samson consists of two rounded granite hills (South Hill towering to 42 m asl), which sweep up from the shoreline, sandy to the east and with low cliffs to the west. A narrow neck of sand separates the two hills. Samson's near neighbours – White, Puffin, Green, and Stony Islands – are low-lying, the last two frequently inundated by high spring tides. There tends to be much interchange of birds between them and so the islands are treated as one unit here. Although the greater part of the islands is covered with bramble *Rubus fruticosus* agg. and Bracken scrub, which can be quite dense in parts, the main seabird interest of Samson itself is found on the Bracken-covered heath and grassland flanks of South Hill and on the low cliffs which fringe the western coastline. Gulls and terns are numerically dominant, there being 1,223 pairs of Lesser Black-backed, 73 of Great Black-backed and 189 of Herring Gull and 47 pairs of Kittiwake (respectively, 37%, 8%, 26% and 18% of the archipelago totals). Fifty-nine pairs of Common Terns nested in 2006 (76% of the archipelago total), all but three of which were on Green Island, and a single pair of Sandwich Terns *S. sandvicensis*. Small numbers of Fulmar (five pairs), Great Cormorant *P. carbo* [hereafter 'Cormorant'] (nine pairs) and Shag (35 pairs) are also present. All the islands are within the Samson SSSI and the SPA.

#### The Norrard and Western Rocks

The many small islands which, along with Annet, guard the western approaches to Scilly, face deep Atlantic water and their rugged form, practically devoid of vegetation, bears witness to the powerful seas that wash over them during winter storms. The breeding bird assemblage, of ten species, is numerically dominated by those nesting on the ledges and crevices of the islands' cliffs, on the buttresses and in the few sheltered hollows between them. The islands are important for Storm-petrel (339 pairs, 24% of the archipelago total), Cormorant (31, 62%), Shag (588, 45%) and Great Black-backed Gull (213, 24%) but they are of particular interest in that they hold the bulk of the archipelago's breeding auks: Common Guillemot *Uria aalge* [hereafter 'Guillemot'] (60 pairs, 39% of the total), Razorbill (236, 69%) and Puffin (105, 60%). All sites are within either the Norrard Rocks or Western Rocks SSSIs and the SPA.

#### The Eastern Isles

Far less rugged than the westernmost islands, the Eastern Isles are rather similar in form to Samson, consisting of tall hills sweeping gently from the sea, flanked by numerous sandy beaches and isthmuses. There are some rocky beaches and numerous rocky outcrops, however, and some islands are flanked by tall, well-creviced cliffs. The vegetation is lush compared with that on the western islands, often consisting of a dense, even impenetrable sward of tall grass, honeysuckle *Lonicera* and bramble, particularly on Great Ganilly and Little Ganinick. A total of seven breeding



Andy Brown

209. Annet, viewed from St Agnes in May 2006. The most important seabird island in the archipelago, with some 1,600 pairs of ten species, including over half the archipelago's total of European Storm-petrels *Hydrobates pelagicus* and Manx Shearwaters *Puffinus puffinus*.

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seabird species were found in 2006, including Shag (330 pairs, 26% of the archipelago total) and Great Black-backed Gull (265, 29%). Also of note were Cormorant (10, 20%) and Fulmar (77, 28%). All the islands are within the Eastern Isles SSSI and the SPA.

*Gugh*

This large, domed island is separated from St Agnes by a sandbar, submerged by each high tide. The island is covered by grassland that, over most of its area, has been invaded by a dense sward of Bracken and gorse *Ulex*. Other areas are quite sparsely vegetated. It is flanked, for the most part, by low cliffs. The area includes The Bow, Cow and Calf and Kittern Rock, which are immediately offshore. It supports six species, including very small numbers of Fulmar (three pairs), Manx Shearwater (nine pairs), Great Black-backed (four pairs) and Herring Gull (69 pairs). The large colony of Lesser Black-backed Gulls (875 pairs, 26% of the archipelago total) and 131 pairs (49%) of Kittiwakes nesting on the island's low cliffs are the main interest. All areas except Kittern Rock are within Gugh SSSI and all lie within the SPA.

*St Helen's, Round Island and Men-a-vaur*

These adjacent islands mark the northernmost edge of the archipelago. Each has a distinct character, however: Men-a-vaur is a rugged,

weather-beaten and sea-pummelled group of three rocks; Round Island is gently profiled, rising to 44 m asl and with large areas covered by a thick mat of introduced Hottentot-fig *Carpobrotus edulis*; while St Helen's is a relatively large, steep-sided yet fairly flat-topped island rising to a similar height. St Helen's is richly vegetated, largely with an impenetrable thicket of bramble and honeysuckle. The islands support 11 breeding seabird species. Of the four species of nesting gulls, there are 687 pairs of Lesser Black-backed (21% of the archipelago total), 14 of Great Black-backed and 84 of Herring Gull, and 36 pairs of Kittiwake. A substantial population of Storm-petrels (271 pairs, 19%) and Manx Shearwaters (52 pairs) inhabit the islands, nearly all among the Thrift, Sea Campion *Silene uniflora* and Hottentot-figs of Round Island. Auks are represented by 95 pairs of Guillemot (61%), 90 of Razorbill and 19 of Puffin, while 45 pairs of Shag and 49 of Fulmar are also of interest. Round Island lies within the Pentle Bay, Merrick and Round Islands SSSI and St Helen's and Men-a-vaur within the St Helen's (with Northwethel and Men-a-vaur) SSSI; all three are within the SPA.

*Other islands with 20 or more breeding seabird pairs*

Just four other islands support 20 or more pairs of breeding seabird: Tean, with five Lesser Black-backed and 49 Herring Gull; Northwethel, with 36 Lesser Black-backed, 15 Great Black-backed and 32 Herring Gull; Guther's Island, with two Lesser Black-backed, 25 Great Black-backed and 13 Herring Gull and one Shag; and White Island, with 187 Lesser Black-backed, six Great Black-backed, 32 Herring Gull and six Fulmar. All lie off St Martin's or between this island and Tresco. Northwethel is within the St Helen's (with Northwethel and Men-a-vaur) SSSI, Tean is part of the Tean SSSI (which includes Pednbrose and Old Man), and White Island is an SSSI



Bryan Thomas

**210.** Manx Shearwater *Puffinus puffinus*, off Scilly, August 2004. The Scilly archipelago is one of just two areas supporting breeding Manx Shearwaters in England. Though currently small, it is hoped that the population of this species will increase considerably following the removal of rats *Rattus norvegicus* from several islands, each with the potential to support substantial numbers.

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in its own right; and these three are within the SPA. Guther's Island is not an SSSI and is not part of the SPA.

*The former status of seabirds on Scilly and recent changes*

While there is considerable evidence that seabirds have long bred on the islands, with archaeological remains of Manx Shearwater, Cormorant and all three auk species having been unearthed at Neolithic sites on Nornour (Turk



211. Shags *Phalacrocorax aristotelis* on the Western Rocks, together with the Bishop Rock lighthouse, guard the nation's Southwestern Approaches in July 2000.

1971, 1984), the lack of systematic counts before 1970 makes assessing and interpreting overall population trends far from straightforward. Fig. 2 brings together data from all the comprehensive counts for the archipelago and shows that, although the total number of breeding seabirds has decreased only slightly in the past seven years (by 2.4%, to 9,161 pairs in 2006), this is part of a longer-term trend which has seen at least a 24% decrease since the peak of 12,063 pairs in 1983 (just prior to SSSI designation in 1986). However, if we correct for the number of unused (i.e. empty) Lesser Black-backed Gull nests, which are currently included within the total count for this species (by applying the standard correction factor of 0.61; O'Connell *et al.* 1997), the overall decline in numbers since 1999–2000 would be a more alarming 9.4%, to 8,821 pairs (see dotted line in fig. 2). Moreover, comparable counts for breeding Storm-petrel and Manx Shearwater are not available before 2000, so we have assumed that they were stable between 1983 and 2000. As past counts, in fact, suggest a higher population (see below), it is likely that we have underestimated the overall rate of decline.

The Isles of Scilly SPA does not cover the entire land area of the islands and

108 and 96 seabird territories, of five species, were recorded outside the SPA in 1999 and 2006, respectively. Thirteen species have bred regularly on Scilly since the SPA was classified, and all were found in 2006, though eight of them in smaller numbers. The following sections explore the changes for each species in turn.

*Cormorant and Shag: apparent stability*

The evidence from written historical accounts and from recent surveys is that relatively few species have maintained their present status, but these are two exceptions. Censused on at least 11 occasions, Cormorant numbers have varied between 49 and 61 pairs since at least 1945, although the exact locations of the small colonies have varied between years. Shags are much more numerous, but the population

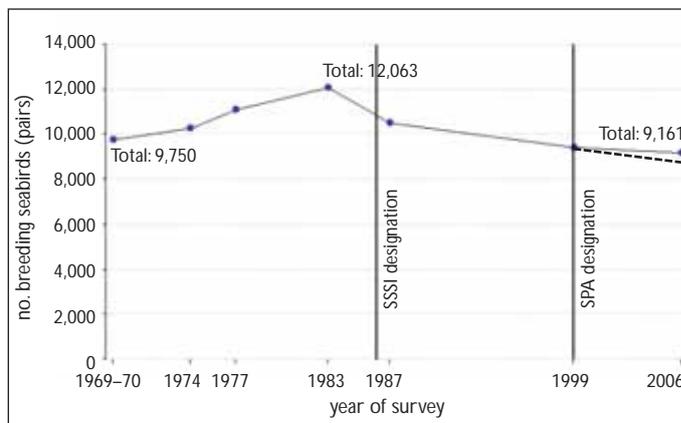


Fig. 2. Species assemblage total, 1969–2006.

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212. A Great Black-backed Gull *Larus marinus* guards its nest on Pednbrose in May 2006, with White Island, St Martin's, in the background.

estimates establish that either there has been a huge decline or past estimates were grossly inaccurate. Estimates of 900–1,000 pairs in 1974 and 850–1,000 pairs in 1977 are still considerably greater than counts from 2000 and 2006, the first to use diurnal playback to elicit responses from birds in occupied burrows. All previous estimates were based on counts of rafting birds around the islands, counts of birds calling at night or catch rates in mistnets. These are not directly

trend is essentially similar; birds were reportedly numerous 'on all the islands' in the early twentieth century and there have usually been some 1,000–1,500 pairs since the late 1960s, though there was a low count of 809 pairs in 1974. Stability on Scilly is in line with regional trends.

*Manx Shearwater and Storm-petrel: uncertain trends*

Shearwaters have long been associated with Scilly. Their remains have been found in prehistoric sites and medieval records suggest the use of 'puffins' (a term generally referring to young shearwaters; Lockwood 1984) to pay land rents as far back as 1337 (Turk 1971). Estimates of shearwater numbers in the nineteenth century range from 200 to 150,000 pairs. Current

comparable and we have only a limited appreciation of how estimates made using such techniques relate to the size of the breeding population. Nonetheless, there is a strong suggestion that numbers are now much lower than formerly; indeed, numbers may still be falling, as they declined by 15%, to 171 pairs, between 2000 and 2006. Furthermore, although shearwaters occupied the same six sites (Annet; Round Island; Shipman Head/Shipman Head Down, Bryher; Gugh; St Helen's; and Wingletang Down, St Agnes) in both the recent censuses, we found none on the many islands from which breeding has been reported in the more distant past (including Tresco, Menawethan, St Martin's Daymark, Gweal, Giant's Castle on St Mary's and Great Innisvoults).

Perhaps overlooked because of their small

size and nocturnal habits, Storm-petrels were not reported from Scilly before the mid nineteenth century but the species then reportedly bred in 'thousands'. Birds apparently continued to breed in some numbers until the first systematic counts were made using playback to identify occupied burrows. An estimated 1,398 pairs in 2006 is a slight decline (5%) on the numbers recorded

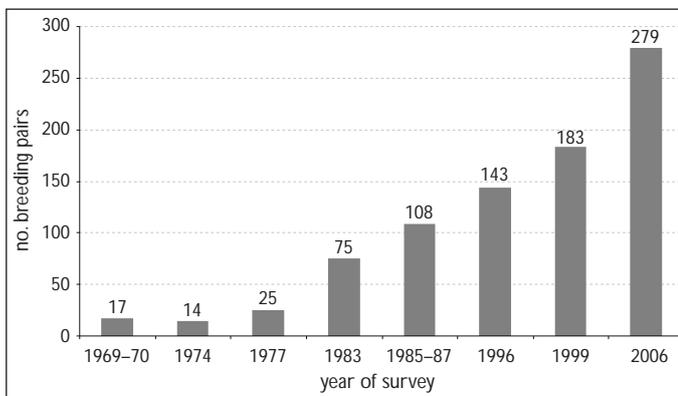


Fig. 3. Number of breeding Fulmars *Fulmarus glacialis* (pairs), 1969–2006.

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during the 2000 survey. There are no comparable previous estimates, either from Scilly or elsewhere, as this census technique was not used in the UK prior to 1999–2000.

*Fulmar: rapid increase of a recent colonist*

Fulmars first bred on Scilly in 1944 (Penhallurick 1969) and numbers have steadily increased since. Both colonisation and growth have been in line with national trends, although growth between the 1999–2000 and 2006 surveys of 52% (a rate which shows no sign of slowing, see fig. 3) bucks the most recent trends at many mainland colonies (Mitchell *et al.* 2004).

*Auks: apparent former abundance and current relative scarcity*

There is archaeological evidence of Guillemot and Razorbill from several sites on Scilly and of Puffin from Nornour (Turk 1971, 1984). Guillemots reportedly once ‘nested in great profusion’ (Clark & Rodd 1906), had become scarce by the late nineteenth century, yet apparently nested in numbers too large to estimate in 1946 (Penhallurick 1969). Razorbills were apparently nesting in ‘extraordinary’ and ‘countless’ numbers by the late nineteenth and early twentieth centuries but appear also to have declined thereafter (see Robinson 2003), while Puffins reportedly bred in ‘thousands’ early in the twentieth century – there is a report of 100,000 pairs on Annet alone in 1908. A huge decline in numbers has apparently thus ensued. Given the apparent scale of change, it is unfortunate that we have no comprehensive counts before 1970. Trends in numbers since then are shown in fig. 4, revealing that all three (despite a worrying and recent decline of Guillemots) have increased substantially since the early 1970s, in line with national trends and even, in

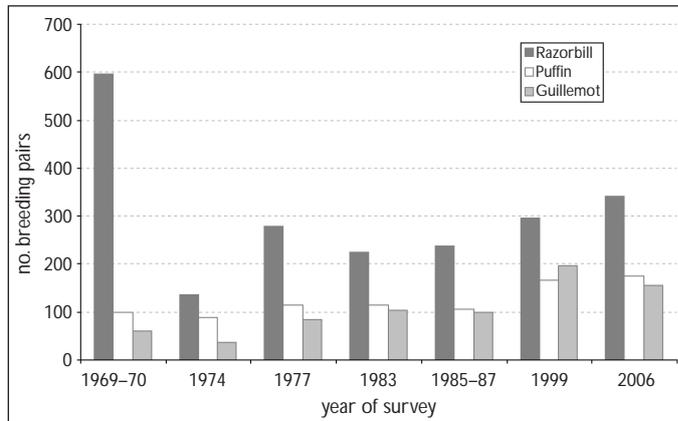


Fig. 4. Numbers of breeding auks, 1969–2006.

the case of Puffin, bucking regional trends (Mitchell *et al.* 2004).

*Terns: three species lost, one gained*

Terns have long been known as breeding birds on Scilly. Interestingly, the three species which no longer breed regularly appear to have been the most numerous in earlier times. Sandwich Tern reportedly bred in reasonable numbers in the nineteenth century, there being at least a hundred pairs in 1841 (Clark & Rodd 1906). By the 1880s, however, breeding had become occasional and from 1911 to 1978 (when 6–7 pairs again nested on the islands; Birkin & Smith 1987) there were no recorded breeding attempts. Small numbers bred annually from 1978 to 1993, with a maximum of 18–22 pairs in 1987, and single pairs have attempted to breed in 1998, 2004, 2005 and 2006. Roseate Tern was ‘tolerably common’ in 1840 but there were just two pairs in 1854, none recorded between 1867 and 1920, and no more than five pairs breeding in any one

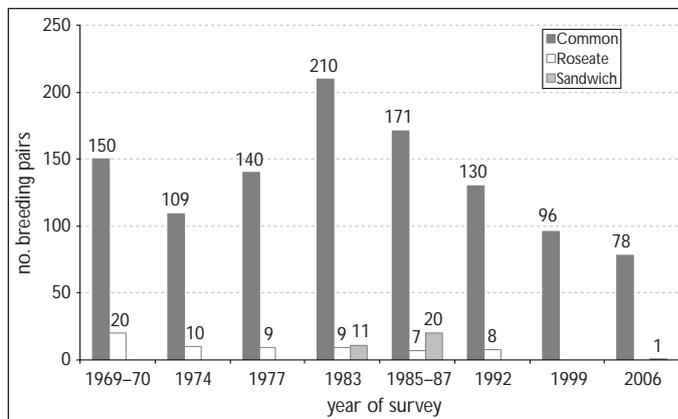


Fig. 5. Number of breeding terns (pairs), 1969–2006.

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213. A storm beach on Annet, site of Scilly's largest European Storm-petrel *Hydrobates pelagicus* colony, in July 2000. Scilly supports the only nesting Storm-petrels in England.

year between then and 1950. An estimated 12 pairs bred in 1959, 20 in 1969, 8–12 in 1979 and 6 in 1989 (Robinson 2003). There were still 6–8 pairs as recently as 1992 but despite extensive searching there has been no proof of breeding since 1995. The loss, recolonisation and subsequent decline of Roseate Tern on Scilly mirrors national and European trends. Arctic Tern also once bred on the islands in some numbers but by the beginning of the twentieth century was much reduced and had almost

certainly disappeared by the late 1920s. The few available records suggest that there were at least occasional breeding attempts in later years: 30 pairs reportedly bred on Annet in 1945, and there were 'a few' there in 1948, 12 in 1963 and 40–60 in 1964; and birds were reported nesting on Tresco in 1973 and 1977. More recently, a single bird was recorded among nesting Common Terns on Samson in 1995 (see Robinson 2003). The only species to nest regularly today is Common Tern, which has bred since at least the 1940s, in which

decade there were 150 pairs on Green Island, Samson, in 1943 and 150 pairs on Annet in 1946 (Chown & Lock 2002). The first comprehensive counts revealed 150 pairs in the archipelago in 1969. Numbers peaked at 210 pairs in 1983 and have fallen steadily since (fig. 5).

*Gulls: apparent former scarcity, recent relative abundance and worrying decline*

Four species of gull breed on Scilly. Historical accounts suggest that both Lesser Black-backed and Herring Gull nested in large numbers early in the twentieth century, with Herring Gull then probably the most numerous of the large gulls. Owing to considerable persecution elsewhere in the nineteenth century, the islands were then also the sole breeding station of Great Black-backed Gull in England, though estimates suggest as few as 200 pairs in the 1920s, rising to 700 pairs by 1933. Kittiwakes bred on Menawethan and Gorregan in the nineteenth century but



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214. One of the lesser joys of seabird censusing: using playback of calls to elicit a response from European Storm-petrels *Hydrobates pelagicus* nesting on Annet in July 2006.

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numbers fell and the species did not breed on Scilly between 1901 (Clark & Rodd 1906) and 1938. Following recolonisation, numbers increased, peaking at 861 pairs in 1983 (Harvey 1983) but declined rapidly towards the late 1990s, since when they appear to have been relatively stable, with 266 pairs in 2006.

The first comprehensive counts of gulls took place in 1969–70. The three large gulls appear to have increased from this time, to a peak sometime between 1974 and 1983, and then fallen to a low in 1999 or 2006, which, other than for Lesser Black-backed, is lower than the 1969–70 count (fig. 6). While trends in Herring Gull, Great Black-backed Gull and Kittiwake reflect national trends, the decline in numbers of Lesser Black-backed Gull is in contrast to regional trends, since populations on mainland southwest Britain are increasing and overall UK numbers are as high as they have ever been (Mitchell *et al.* 2004).

Discussion

Key concerns

Among the complexity of changes in the seabird populations on Scilly, it is possible to discern some worrying trends – in overall numbers, in the numbers of individual species and in the numbers on individual islands or island groups. We have particular concern over the following:

- The overall number of seabirds breeding on Scilly has declined by at least 24%, from c. 12,063 pairs in 1983 to 9,161 pairs in 2006. There is a strong

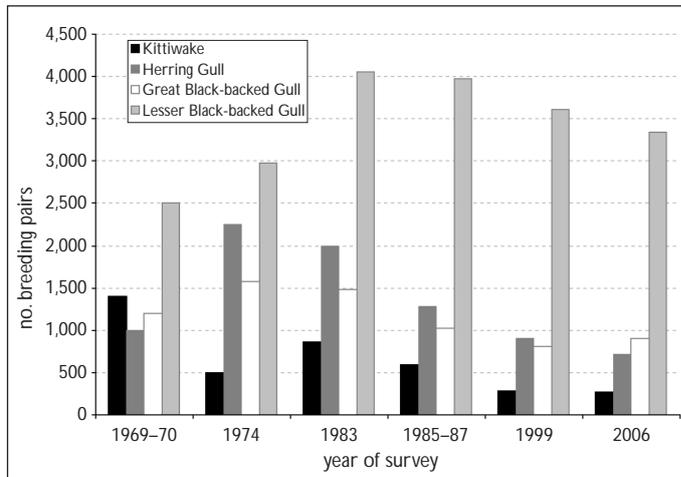


Fig. 6. Numbers of breeding gulls (pairs), 1969–2006.

suggestion that, if comparable counts for Storm-petrel and Manx Shearwater were available prior to 2000, our assessment of the scale of decline would be worse still.

- Four species have declined by over 25% in the last 25 years: Herring Gull (down by 64%), Kittiwake (69%), Great Black-backed Gull (39%) and Common Tern (63%).
- Numbers on four of the eight SSSIs with a qualifying seabird interest have fallen by 37% or more since designation (using information on bird numbers from 1983): Eastern Isles (decreased by 45%), Shipman Head (43% in the last seven years alone), Samson group (41%) and Annet (37%).



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215. Round Island, at the northern fringe of the archipelago, May 2006. This island supports important numbers of Manx Shearwaters *Puffinus puffinus* and European Storm-petrels *Hydrobates pelagicus*, many of which nest beneath dense mats of the introduced Hottentot-fig *Carpobrotus edulis*.

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Bryan Thomas

**216.** A juvenile Kittiwake *Rissa tridactyla* from the Gimble Porth colony, on the eastern side of Tresco. The low cliffs which fringe Gimble Porth support one of the few remaining Kittiwake *Rissa tridactyla* colonies on Scilly. Long known as breeding birds in the archipelago, Kittiwakes were absent between 1901 and 1938 but following recolonisation increased to a population of over 800 pairs in the early 1980s. There has since been a 70% decline in numbers and there was complete breeding failure in both 2006 and 2007.

Most of the losses are accounted for by the loss of gulls.

- Numbers of eight of the 13 species which breed regularly on Scilly fell between 1999–2000 and 2006, Herring Gull and Guillemot numbers declining by 21% in this brief period.
- The Kittiwake population has fallen by 5% over the last seven years and the species fledged no young on the islands in at least 2006 and 2007.
- The overall number of seabirds breeding on Annet, the most important of the seabird islands, has fallen by 20% over the last seven years.
- The numbers of seabirds nesting on the inhabited islands of Tresco, St Martin's, Bryher and St Agnes have fallen by up to 70% in the last seven years, these losses relating mainly to gulls.

#### Factors affecting seabirds on Scilly

##### 1. Persecution and disturbance

Seabirds on Scilly appear to be rarely persecuted. The Nature Conservancy Council

culled Great Black-backed Gulls on Annet in 1978, reducing the island population by 35%, and it is thought that other, unofficial culls have taken place on occasion. These culls have usually been associated with efforts to conserve other seabird species. More recently, Lesser Black-backed and Herring Gulls have been dissuaded from nesting close to the terneries on Samson, to try to keep these areas, which are safe from tidal inundation, available for nesting terns. The number of nests destroyed has not exceeded 20 in any one year and many of the birds affected are likely to have re-nested elsewhere on the island. There are occasional reports of gulls being shot on the inhabited islands, presumably to prevent them nesting on

buildings. However, surprisingly few gulls nest on the rooftops of St Mary's and gulls are declining on the other inhabited islands (in contrast, roof-nesting is now commonplace elsewhere in the UK – in Cornwall, for example, this habit increased by nearly 900% between 1976 and 1998–2002, when almost 1,500 pairs nested on buildings at 35 sites; Mitchell *et al.* 2004).

Tourism is a vital part of the economy of the islands, accounting for 85% of the local economic revenue of Scilly. The requirement for visitor management is widely recognised, so the activities of those with an interest in wildlife and wild places are closely but discreetly controlled. The most important seabird islands are permanently closed to visitors (many are also extremely dangerous islands on which to land, so access is effectively impossible anyway): Men-a-vaur, Hanjague, Great Ganilly, Great and Little Innisvouls, Menawethan, the Western Rocks, Annet, Melledgan, Mincarolo, the Norrard Rocks and Scilly Rock. Furthermore, some islands are closed during the breeding season, while access to others is permitted only

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along well-defined routes which avoid the most important seabird areas. Notices, temporary fences and visiting wardens help to manage visitor access and regulate disturbance. However, provision for visitors to witness the Scilly seabird spectacle is still considerable: a plethora of boat operators offer visits to the waters around the seabird islands, some guided by expert local ornithologists, while there are late-evening visits to witness rafting shearwaters and pelagic trips to search for petrels and the rarer seabirds of the Southwestern Approaches. This suite of measures appears to be effective in keeping seabirds and visitors separated by an appropriate distance. We do not believe that either persecution or recreational disturbance influences recent seabird population trends significantly.

#### 2. Mammalian predators

Scilly supports just one native land mammal, the endemic Scilly race of the Lesser White-toothed Shrew *Crocidura suaveolens cassiteridum*. It is not known as a predator of seabirds, their eggs or young. In contrast, introduced Brown Rats *Rattus norvegicus* (now widespread throughout the archipelago), cats and dogs (found mainly on the inhabited

islands) and Hedgehogs *Erinaceus europaeus* (found only on St Mary's) are rapacious predators of seabirds worldwide (Atkinson 1985; Jackson & Green 2000). On Scilly, as elsewhere in the UK (e.g. Brooke 1990, Thompson *et al.* 1997, 1998, Swann 2000, Upton *et al.* 2000), they have done much to reduce the suitability of offshore islands for nesting seabirds.

The effects of mammalian predators are clearly apparent in the distribution of seabirds within the archipelago. For example, all 11 Storm-petrel colonies are located on islands which have long been known to be rat-free (though Annet was occupied by rats for a brief period in the mid 2000s). A similar pattern is evident in Orkney and Shetland, where the presence or absence of rats was found to be the single most important factor in explaining the breeding distribution of Storm-petrels (de León *et al.* 2006). Several islands in the Scilly archipelago, including Gweal and Menawethan, have large areas of apparently suitable habitat for other species but the current absence of former breeders such as Puffin and Manx Shearwater is believed to be due to the presence of rats. A number of small, uninhabited islands, notably those forming the Western and Norrad



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217. European Storm-petrels *Hydrobates pelagicus* photographed in July 2005 from one of the summer-evening pelagic trips which operate regularly from St Mary's; just part of the seabird spectacle awaiting visitors to the Scilly archipelago.

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Rocks, have never been known to support rats: they are regularly battered by storms and washed over by winter tides, and food availability outside the seabird breeding season must be scarce. Other uninhabited islands support thriving populations of rats, and feral cats are established on Gugh.

There have been numerous attempts to control rats on Scilly, but these have tended to provide only temporary benefit as rats have quickly recolonised cleared islands from adjacent islands, accessible on the lowest of spring tides. The concerted programme of rat control instigated recently by the IOSWT, with support from Natural England and the RSPB, has used a different approach, and has eradicated rats from groups of adjacent islands and from any parts of inhabited islands likely to be a source of new colonists. There have now been apparently successful eradications from Samson, St Helen's, Tean, Northwethel, Menawethan and the Eastern Isles (Mawer & Williams 2007). Monitoring is an essential part of the programme and relies on regular inspection of baited monitoring stations, in turn allowing immediate action to remove rats as soon as they are found. The lack of such routine monitoring on Annet, long known to be rat-free, prevented early detection of the recent incursion. Once discovered, the rats were found to be numerous and although an immediate and apparently successful eradication ensued,

the rats had clearly been active for at least one and perhaps several breeding seasons. Their activities may go a long way to explain the large decline in breeding seabirds on Annet between 1999 and 2006, particularly Storm-petrels, which decreased by some 16%.

The rat populations on St Mary's, Tresco, St Martin's, Bryher and St Agnes are likely to be responsible for the current small size of seabird populations on these large and otherwise apparently suitable islands; unless rats are eradicated, it is unlikely that this situation will improve. Moreover, these islands will always act as a source of rats capable of colonising adjacent islands, moving between them on boats or when tides are exceptionally low. The eradication of rats from the entire archipelago is likely to be the most effective long-term solution, not only to seabird predation, but also to the other public health risks posed by rat infestation (Battersby & Webster 2001). Furthermore, initiatives should be taken immediately to control feral cats (especially those on Gugh) and to prevent the spread of Hedgehogs from St Mary's to other islands.

### 3. Avian predators

The role of native avian predators in the dynamics of seabird populations on Scilly is, as elsewhere, much less clear-cut. Raptors, herons (Ardeidae), large gulls, corvids and some waders may opportunistically take seabird eggs

or young. Numbers of many such predators are low but Scilly does support Herring, Lesser Black-backed and Great Black-backed Gulls in large numbers, such that they are regarded as of conservation importance in their own right (see above). Great Black-backed Gulls in particular are often reported as predators of seabirds. It is interesting to note that Shag numbers have recently increased where the numbers of large gulls have decreased, for example on Menawethan and Great Innisvoul; and have declined where



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218. Poisoned bait in place on Tean in May 2006, with warning and information signs (for humans) placed by the Isles of Scilly Wildlife Trust as part of the successful eradication programme supported by RSPB and Natural England.

Great Black-backed Gulls have increased, such as on White Island, Samson. On Annet, the increase in Great Black-backed Gull numbers in the last seven years has coincided with a decrease in the numbers of most other species. Examination of pellets and predated carcasses also confirms that these gulls take seabirds, notably adult petrels and shearwaters, although for two reasons it is not necessarily the case that they have a population-level effect on their prey. Firstly, predation by gulls on burrow-nesters such as petrels and shearwaters focuses mainly on prospecting non-breeders and fledglings, these birds being taken in the air or on the ground. Breeding adults tend to fly quickly to and from colonies and spend little time on the ground (Brooke 1990). Secondly, predation on other birds tends to be carried out by only a proportion of gulls, which seem to specialise in such behaviour; since it is behaviour rather than abundance which is important, levels of predation may not vary directly with the size of the predator colony (Furness 2003; Votier *et al.* 2004; Oro *et al.* 2005).

We believe it is unlikely that the recent decline in breeding seabirds on Scilly can be attributed to Great Black-backed Gull predation. First, the number of Great Black-backed Gulls on Annet and in the archipelago as a whole is much lower now than in the early 1970s, when detailed studies concluded that levels of predation did not have a significant impact on the populations of shearwaters, petrels or Shags (Allen 1974). Second, large increases in the number of pairs of Puffin (3 to 14), Storm-petrel (57 to 129) and Shag (117 to 137) on Rosevear, site of the second-largest Great Black-backed Gull colony in 2006, have been coincident with a small increase in the gulls from 95 to 109 pairs between 1999/2000 and 2006. We also know that the large decline in seabird numbers on Annet was coincident not only with an increase in Great Black-backed Gull numbers but also with an incursion of Brown Rats.

Rabbits *Oryctolagus cuniculus* occur on Annet and a number of other islands and there may be an interaction between their numbers and levels of both gull and rat predation on seabirds, the intensity of predation being related to the availability of alternative food sources (Uttley *et al.* 1989; Furness *et al.* 1997; Robertson & Colombe 2001). For example, recent losses at a French Storm-petrel colony

have been linked to predation by Great Black-backed Gulls, which has increased since the gulls' alternative food supplies, mostly rabbits, have disappeared (B. Cadiou pers. comm.). In contrast, on an island in New Zealand where rat predation was suppressing petrel breeding success, the problem was exacerbated by the *introduction* of rabbits, a food source through the winter when the petrels were absent, allowing the island to support a larger rat population (Imber *et al.* 2000). The mainly nocturnal habits of the rabbits on Annet suggest that their predation by gulls is significant and it would be interesting to explore this relationship further.

Large gulls are also capable of displacing other breeding seabirds, including Puffin (Finney *et al.* 2003; Soanes *et al.* 2006). The majority of Puffins on Scilly nest on islands where there are few large gulls but it is possible that gulls may influence Puffin recruitment on Annet and St Helen's, where they co-exist. A study of gull and Puffin nest-site proximity and of interactions between the two species would be useful for the management of this iconic and economically important species.

#### 4. Habitat change

Invasive non-native plants are widespread on Scilly. Together with changes in the relative abundance of native plant species through human management, they can influence breeding seabirds directly (by reducing the amount of suitable nesting habitat) or indirectly (by providing habitat for predators). The long-term decline in the numbers of Puffins on Annet, for example, has been attributed by some to vegetation change, specifically the development of a tussocky sward, which favours breeding gulls over Puffins (Allen 1974).

On Scilly, the species most obviously affected by vegetation is the Lesser Black-backed Gull. The majority nesting in the four main colonies do so among dense ground cover and the species appears better able to maintain numbers on islands with greater vegetation cover (e.g. Samson and St Helen's) than where vegetation is less dense (e.g. Annet and Gugh) or suppressed (e.g. after winter salt damage or dry summers) (Robinson 1993, 2003). Tall vegetation around gull nests has been shown to reduce predation rates (Brouwer & Spaans 1994), provide a sheltered microclimate

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(Calladine 1997; Kim & Monaghan 2005) and reduce conspecific aggression (Bukacińska & Bukaciński 1993; Gotmark *et al.* 1995; Ellis & Good 2006). There is, however, a trade-off between nest-site concealment and predator visibility (sparse cover allows early detection of predators but the nest itself is more visible; Gotmark *et al.* 1995, Borboroglu & Yorio 2004) and while dense vegetation may also deter human visitors, reducing disturbance, it may eventually hamper chick manoeuvrability and access by adults. Given the continued decline of Lesser Black-backed Gulls on Scilly, a study of the effect of vegetation cover on gull distribution would be invaluable; it should incorporate a review of the historical balance of the main vegetation types, particularly on Annet, Samson, St Helen's and various Eastern Isles, as large areas on these islands are dominated by dense stands of Bracken, honeysuckle and bramble.

5. *Changes in fisheries discards, agriculture and the management of waste*

Changes in the abundance of breeding seabirds on Scilly may relate to wider regional, national or global factors, including changes in the management of fisheries discards and of human waste. Commercial fisheries produce enormous volumes of unwanted fish and offal that are often discarded overboard, thus providing food for scavenging seabirds such as Fulmar and gulls (Hamer *et al.* 1997; Reeves & Furness

2002). It is widely accepted that the huge increase in fishing activity during the twentieth century fuelled burgeoning Fulmar and gull populations, at least until the 1980s. In addition, new feeding opportunities at large rubbish dumps and landfill sites have benefited gulls since at least the 1970s (Grieg *et al.* 1986). More recently, with fishing effort curbed to protect fish populations, offal retained for conversion to fish meal and changes in the management of refuse (with more being incinerated or buried), the availability of food for scavenging seabirds has declined (Reeves & Furness 2002). This may have led to falling productivity of large gulls (Pons & Migot 1995; Perrins & Smith 2000), while the calamitous decline in nesting Herring Gulls in Britain, by as much as 57% since 1969, is often attributed to changes in fisheries and waste management practices. In line with this national trend, Herring Gulls on Scilly have declined precipitously, to just 32% of the 1974 peak of 2,249 pairs. The Scillonian fishery has never been large, takes mainly shellfish, and does not involve the landing of any commercial fish. However, the large fishing fleet based at Newlyn, Cornwall, often operates within the foraging range of Herring Gulls from Scilly and thus its activities may have influenced seabird trends on the islands. Although the human population of Scilly is small (2,100 in winter, up to 5,000 in summer) and there are few waste-disposal sites, it is plausible that improvements

in waste management on Scilly (the majority of waste is now incinerated) may have contributed to the Herring Gull's decline. Interestingly, the other large gulls have not declined so precipitously and tend to be less reliant on man-made food sources.

6. *Climate change*

Since the 1970s, global warming has increased the frequency of severe weather events around the world (Intergovernmental Panel on Climate Change 2001). Warming may also cause greater fluctuation



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219. A tranquil scene in May 2006: a Herring Gull *Larus argentatus* nesting among boulders, lichens and Hottentot-figs *Carpobrotus edulis* on St Agnes.

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in the North Atlantic Oscillation (NAO), a measure of the pressure differential between tropical and polar air masses, tending to produce more warm, wet and stormy weather in northern Europe. Under such conditions, the abundance of zooplankton and the recruitment of sandeels *Ammodytes* in the northeast Atlantic and North Sea are low (Planque & Taylor 1998; Arnott & Ruxton 2002). It is not clear whether food availability for seabirds in Scillonian waters is, or has been, similarly affected. Surface-feeders and those with short foraging ranges, inflexible time budgets or restricted diets are likely to be adversely affected by reduced food availability before those which can alter their behaviour, foraging areas or diet (Furness & Tasker 2000). Kittiwakes are small-bodied surface feeders, with a relatively restricted foraging range and are strongly affected by local changes in prey abundance or availability (Hamer *et al.* 1993; Furness 1997; Regher & Montevecchi 1997; Lewis *et al.* 2001; Daunt *et al.* 2002). Kittiwake numbers across the south of England fell by about 40% between 1985 and 2000 (Mitchell *et al.* 2004); those on Scilly have declined by 70% since 1983. Monitoring work on Scilly and at other sites in southwestern England showed complete breeding failure in both 2006 and 2007 (H. Booker pers. comm.). On Scilly, most nests were lost when chicks were between two and three weeks old, which supports the idea that failure was down to poor food supply; chicks may either starve or suffer predation, as food-stressed parents spend longer foraging away from the colony and their nests are exposed to predators for longer (Bukacinska *et al.* 1996, 1998; Perrins & Smith 2000). Monitoring Kittiwake productivity on Scilly thus provides a sensitive measure of food availability in surface waters around the islands.

The tendency of climatic change to result in stormier weather, particularly at unusual times of year, may also adversely affect seabirds, for example by nest

inundation, chick mortality and mass-kills of vulnerable species (Robinson *et al.* 2002). Bad weather has affected seabirds in several parts of the UK in recent years, and there are reports of terns being buried in blown sand in Norfolk and of storms washing eggs and young from exposed cliffs (Ratcliffe 2004). On Scilly, Common Terns repeatedly choose to nest on low-lying sites which are already frequently inundated by sea water, despite human attempts to lure birds to safe, alternative nest-sites nearby (plate 220). Any increase in storminess can only exacerbate the problem and since the return of former breeders such as Roseate Tern probably depends on the maintenance of a strong tern colony in the archipelago, prospects for that happening are not bright. A feature of the 2006 breeding season on Scilly was the apparent abandonment of nesting attempts, after scrapes had been made but before eggs were laid, among Lesser Black-backed Gulls (up to 30% of attempts were abandoned at some sites). This habit is well-known in other colonies and is thought to be due to poor weather in May (Calladine & Harris 1997; O'Connell *et al.* 1997). It seems likely that weather-related breeding interruptions will increase and we have great concern for the future effects of climate change on Scilly's seabirds.

#### 7. Pollution, disease and fisheries bycatches

A number of diseases and natural toxins can affect seabirds. Avian botulism in gulls (Lloyd *et al.*



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220. Decoys and tern calls broadcast from a CD player have been used during attempts to lure Common Terns *Sterna hirundo* to their traditional nesting site on North Hill, Samson, and away from low-lying beaches regularly washed over by spring tides. Photo taken in July 2000.

*al.* 1976), puffinosis in Manx Shearwater chicks (Brooke 1990) and 'red tide' toxins in Shags and Kittiwakes (Potts *et al.* 1980; Coulson & Strowger 1999) can all cause significant mortality. However, none of these are known to have affected birds on Scilly. Exposure to oil can be fatal owing to the fouling of feathers and the pathological effects of oil ingestion (Leighton 1991; Briggs *et al.* 1997). However, apart from large disasters such as the wreck of the Torrey Canyon oil tanker in 1969, which may have affected auk populations on Scilly, this also does not appear to be a significant problem on Scilly (though oil pollution may have wide-reaching impacts on some seabird populations; Votier *et al.* 2005). Inshore fixed gill-nets can be a source of considerable mortality for pursuit-diving seabirds, especially if set close to large breeding colonies (Piatt & Nettleship 1987), but the local Scilly fishery is small and unlikely to cause change at the population level.

#### *Key actions for recovery*

Birds, and seabirds in particular, are an important attraction for visitors to Scilly and, as much of the islands' economy is founded on tourism, the conservation of seabirds must be of central concern to all those with interests in the archipelago. A detailed plan of action – the Isles of Scilly Seabird Conservation Strategy (Lock *et al.* 2006) – has been drawn up by the organisations with responsibilities and interests in conserving seabirds on Scilly. The essential elements of the plan are to:

- Continue the non-native mammal monitoring and control programme to ensure that islands currently without rats remain rat-free.
- Extend the control programme to remove feral cats from Gugh.
- Maintain localised control of rats in the vicinity of important colonies where eradication is not currently feasible and at points most likely to be used by rats when they move to rat-free islands.
- Consider eradication of rats from the entire archipelago as a more cost-effective long-term solution to rat predation and other rat-related problems.
- Ensure that steps are taken to prevent further introductions of Hedgehogs to the archipelago and to ensure that the mammals do not spread from St Mary's.
- Extend the SSSI and/or SPA boundary to

include the significant seabird colonies on Wingletang Down SSSI and on Plumb, Guther's and Pernagie Islands off St Martin's.

- Advise extension of the seaward boundary of the SPA to include marine features important in supporting the SPA seabird assemblage.
- Increase public awareness of the importance of the islands for seabirds and especially of human impacts on breeding seabirds, notably through recreational disturbance and the introduction of non-native predators.
- Maintain the programme of restricted access to important/sensitive seabird colonies.
- Review patterns of historical vegetation change on key islands and conduct field trials into the effects of vegetation patch clearance on densely vegetated islands on seabird (especially gull and tern) numbers and breeding success.
- Ensure that areas of suitable habitat for nesting terns are maintained on predator-free islands away from areas subject to tidal inundation.
- Repeat all-island seabird surveys at six-yearly intervals and establish an annual productivity monitoring programme encompassing key species on selected islands which informs the requirements for, and success of, the above measures. This may act as a 'quality of life' indicator for Scilly and will contribute directly to the national seabird monitoring programme.

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