

# The decline of Shetland's Kittiwake population

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*'There are few prettier sights for a naturalist than a flock of Kittiwakes [Rissa tridactyla] feeding in a secluded Shetland voe. The birds will hover above the water for a few seconds, and then dash suddenly in, almost always going right under out of sight, and will then rise lightly and easily, the wings appearing first, raised above the back. A visit to the Kittiwakes at home is no less interesting than a study of them upon the voes. They delight in building upon the ledges of the highest and steepest cliffs, and in the breeding season form an adjunct to the wild and beautiful regions of their choice.'* (Saxby 1874)

The words of Henry Saxby, Shetland's foremost naturalist of the nineteenth century, encapsulate the magic of Kittiwakes, which are an integral part of the summer scene in Shetland. From the great cliffs of Fair Isle, Foula, Hermaness and Noss to tiny, little-known islands such as North Benelip, the Dore Holm and Gruna Stacks, Shetland's Kittiwake colonies have long attracted the interest of visiting ornithologists, as well as fishermen and seafarers. The Shetland population is, however, now in serious decline, with many former colonies abandoned and most others severely depleted in numbers. Detailed counts of the major breeding stations (a 'breeding station' comprises a group of colonies separated by less than a mile of land or sea) began in the early 1960s, and continued during the Operation Seafarer survey of 1969-1971 (Cramp *et al.* 1974) and in a survey by the Institute of Terrestrial Ecology (now the Centre for Ecology and Hydrology) in 1974 (Harris 1976). Most of these counts were made from land, but, in fact, a high proportion of Shetland's Kittiwakes nest on offshore stacks or around cave entrances which are not visible from the cliff-tops.

It was not until 1981 that a comprehensive sea-borne census of the population was made, by the Nature Conservancy Council (in Scotland, now Scottish Natural Heritage), using an inflatable boat to cover long stretches of coastline in a single day, and to gain access to colonies where it is too risky to take a hard-hulled boat. That 1981 census revealed 54,264

apparently occupied nests (AONs) in the whole of Shetland (Richardson 1985), later revised to 54,600 nests (AONs plus trace nests) (Heubeck *et al.* 1999). This represented almost 10% of the British & Irish population, and perhaps 1-2% of the North Atlantic population (Lloyd *et al.* 1991).

The Shetland Oil Terminal Environmental Advisory Group (SOTEAG), the Nature Conservancy Council, and Fair Isle Bird Observatory continued to monitor Kittiwake numbers during the early 1980s. By 1985/86, however, once the first counts had been made for the Seabird Colony Register census, it became clear that some colonies in Shetland had increased while others had declined, and that these changes were happening at very different rates (Heubeck *et al.* 1986). Consequently, SOTEAG abandoned its attempts to monitor population change by repeated counts of fixed study plots at specific breeding stations, opting instead to survey all Shetland Kittiwake colonies by inflatable boat at intervals of (ideally) no more than three years, and to check suitable coastlines for newly established colonies. This methodology has continued to the present day, and a population trend for Kittiwakes in Shetland has been derived by calculating the average annual rate of change between actual counts of nests at each breeding station, and then summing these estimates and actual counts for each year (Heubeck *et al.* 1999).

The total Shetland population has declined progressively since 1981, and most dramatically

during the late 1980s and the 1990s (fig. 1). By 2001, the population in Shetland was down to an estimated 16,500 breeding pairs, a decline of almost 70% since 1981, with a loss of more than 38,000 pairs. In 1981, a third of the Shetland population bred on Fair Isle, the southernmost of the islands. As colonies farther north have diminished or been abandoned, Fair Isle's proportion of the total population has increased to 50% (by 2001), even though numbers on Fair Isle have also decreased sharply, from 19,340 nests in 1988 to 8,204 in 2001.

There are two key reasons for this dramatic decline. First, breeding success has been generally low since monitoring began in 1986 (fig. 2). The years of low breeding success during the 'sandeel crisis' in the late 1980s were followed by a resurgence in fortunes in the early 1990s, as stocks of sandeels *Ammodytes marinus* recovered somewhat. Since then, breeding success has been highly variable, but generally declining, with virtually complete breeding failure in 1998 and 2001. In 2001, for example, the season was progressing well until the first chicks hatched, towards the second week of June. Suddenly, chicks began to die in the nest, and most Shetland colonies had failed completely by early July. Food shortage was undoubtedly the cause, in particular the lack of sandeels, which are the staple diet of Kittiwakes in Shetland during the summer, although the small local sandeel fishery, which is closely regulated to reduce its impact on breeding seabirds, cannot be blamed for this in recent years (see *Brit. Birds* 94: 151).

The factors which cause periodic food shortages such

as that experienced in 2001 are likely to be complex, but diving seabirds, such as Shags *Phalacrocorax aristotelis*, Common Guillemots *Uria aalge* and Razorbills *Alca torda*, are typically affected less than are surface feeders, such as Kittiwakes and terns *Sterna*. Dietary studies in the Firth of Forth, Fife/Lothian, have shown that Kittiwakes feed on sandeels aged one year or older during May but switch to feeding mainly on '0-group' sandeels (those hatched in

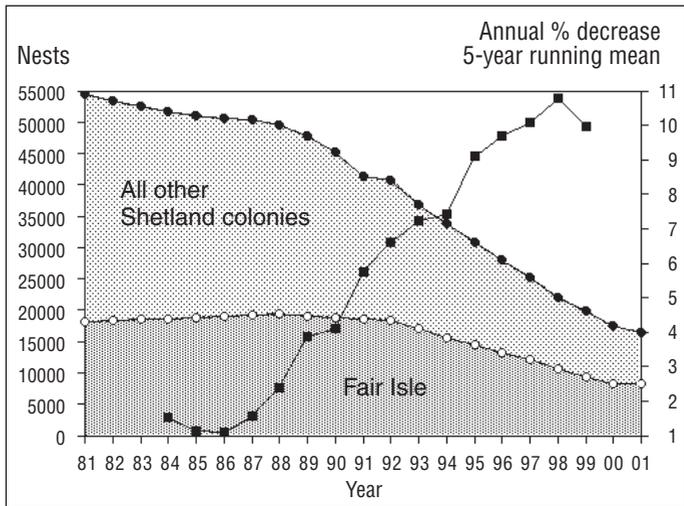


Fig. 1. The decline in the Kittiwake *Rissa tridactyla* population in Shetland, 1981-2001. Filled circles show the whole Shetland population, and open circles the Fair Isle population. The points on the graph are a mixture of actual counts and interpolation between such counts (see text). Rate of decline is indicated on the right-hand axis, showing a five-year running mean of the annual percentage decrease of the whole Shetland population.

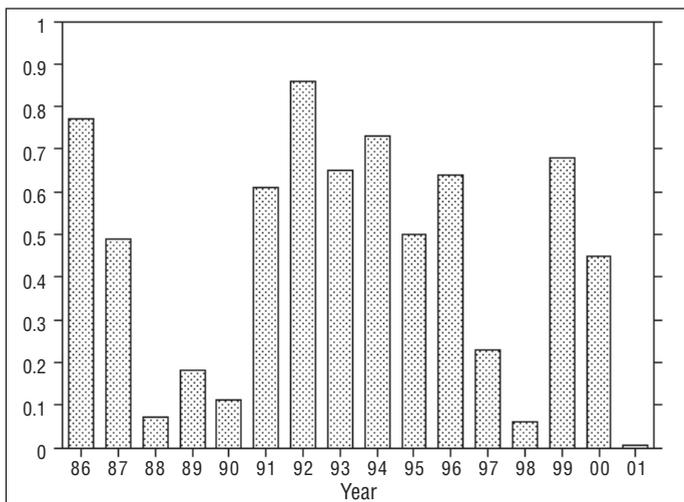


Fig. 2. Average breeding success of Kittiwakes *Rissa tridactyla* in Shetland, 1986-2001. Breeding success is calculated from mean number of chicks fledged from nests at which incubation was recorded or assumed.



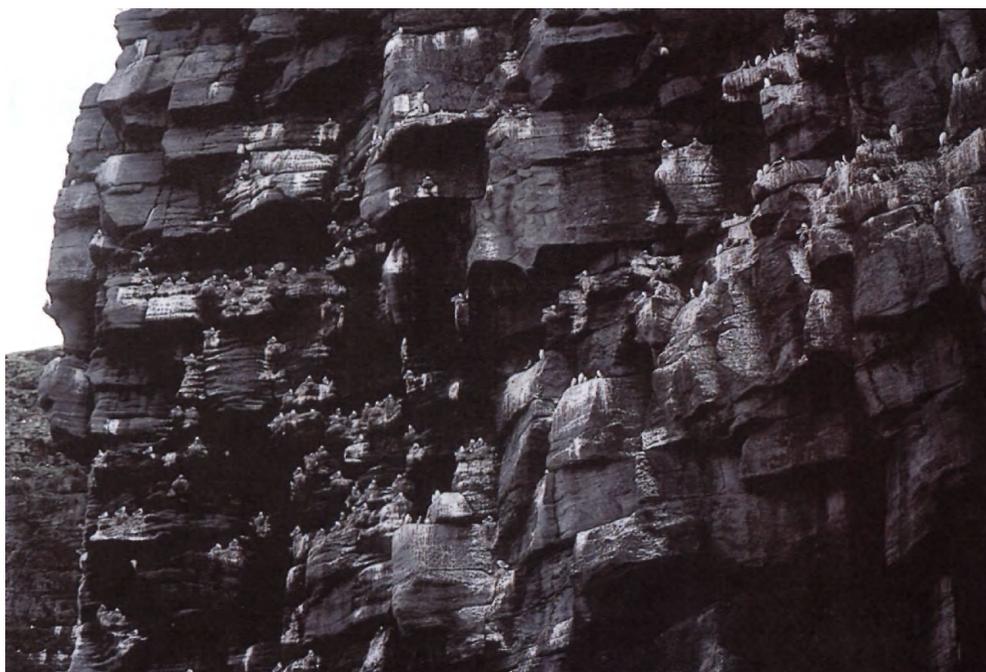
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57. Kittiwake *Rissa tridactyla* colonies at Corbie Geo, Nones, Shetland, June 1977. A total of 713 nests was counted at this station from photographs taken on 25th June 1977. The station held 707 nests in 1981, but by 1991 this number had declined to 132 nests, and the station was completely deserted by 1994.

the current year) during early June, as the older fish begin to spend more time buried in the seabed sediment and the 0-group fish metamorphose from a planktonic larval phase to form shoals (Lewis *et al.* 2001). In that study, Kittiwake breeding success was lowest in years of late appearance and low growth rates of 0-group sandeels. It is likely that a similar situation exists in Shetland, but, whatever the cause, the breeding output of Kittiwakes in Shetland in recent years (on average, during 1986-2001, 0.44 chicks fledged per AON) has been well below that required to maintain the population. For comparison, this productivity is lower than in nearby Orkney (1.01 chicks fledged per AON, 1989-2000), and also lower than in northeast Scotland (0.64 chicks per AON, 1986-2000) and southeast Scotland (0.74 chicks per AON, 1986-2000) (Mavor *et al.* 2001).

The second factor involves predation at colonies by Great Skuas *Catharacta skua*, which increased in numbers during the late 1980s. Skuas were also affected by the scarcity of sandeels during the late 1980s, since they fed directly on these fish and kleptoparasitised other seabirds carrying sandeels. Great Skuas then 'discovered' an alternative food source to sandeels: the direct predation of species such as

Kittiwakes and Atlantic Puffins *Fratercula arctica*. Great Skuas are extremely efficient predators, and as long ago as the 1950s concerns had been voiced about their potential impact on Kittiwake numbers (Venables & Venables 1955). More recent studies have also drawn attention to the predation of other seabirds by Great Skuas (e.g. Furness 1997; Heubeck *et al.* 1997; Phillips *et al.* 1999; but see also Votier *et al.* 2001). The predation of Kittiwake chicks and, at some colonies, adults and their eggs, and the increase in this behaviour during the past 15 years, have undoubtedly been the major cause of the collapse of certain breeding stations, for example those at Eshaness and the nearby skerries, which have declined from 3,050 pairs in 1989 to just 110 pairs in 2001. In addition, Great Skuas have contributed to the general population decline of Kittiwakes by further reducing breeding success and, almost certainly, increasing adult mortality rates, too. At many breeding stations, the greatest declines have been at colonies in 'open' situations, most vulnerable to attack by skuas. Consequently, an increasing proportion of Shetland's Kittiwakes now breeds in colonies at the heads of narrow inlets ('geos') or in cave entrances, where skuas find it difficult to manoeuvre.



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58. Kittiwake *Rissa tridactyla* colony at Brei Geo, Troswick, Shetland, June 1977. This geo held 360 nests in 1977, and 354 nests in 1981. By 1991, these had declined to 149 nests and, following heavy predation during 1993 and 1994, numbers collapsed in 1995. Only 20 nests were counted in 2001.

Of a total of 58 breeding stations known to have existed in Shetland since 1980, 14 small ones have now been abandoned, two new ones have become established, and one has been reoccupied after having been deserted for a decade. Only three stations (the islands of Fair Isle, Foula and Noss) now hold more than 1,000 pairs, compared with nine in 1981. Even some of those colonies which held more than 1,000 pairs in 1981 may soon be abandoned: for example, Ramna Stacks supported 1,350 pairs in 1981, still held 886 pairs in 1992, but had been reduced to just 51 pairs by 2001.

The Kittiwake is not a globally threatened species, and in 1981 the Shetland population, despite being important in a European context, was still only a tiny fraction of that breeding in the North Atlantic. In contrast, the Shetland population of Great Skuas comprises almost 42% of the world population (Lloyd *et al.* 1991), which presents an extremely difficult conservation issue. The results of the Seabird 2000 census of British and Irish breeding seabirds are not yet available, but it is probable that Shetland still holds 3-5% of the British & Irish breeding population of Kittiwakes. Further declines in Shetland, possibly to below 10,000 pairs by the end

of the present decade, are almost inevitable, however, and there seems to be nothing that we can do to halt it. Fluctuations in local sandeel abundance and their availability to Kittiwakes are now driven probably by physical factors rather than by fishing regimes, and the predatory habits of Great Skuas have become too widespread among the population for limited 'intervention' by Man to be of any help.

Not so long ago, it took considerable time and skill to count colonies such as those on the Skerry of Eshaness, Fogla Skerry off Papa Stour, or Horse Island off the southern tip of Mainland. Nowadays, the same boating skills are still necessary to negotiate tide rips and Atlantic swells, but all too often we come across a blank, grey cliff-face, silent and deserted, where once clicker-counters were set to zero amid the noise and clamour of a vibrant Kittiwake colony.

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59. Part of a Kittiwake *Rissa tridactyla* colony at South Gunnawark, Fair Isle, Shetland, June 1995. Kittiwakes nesting in more inaccessible sites such as this are less prone to suffer from predation than are those in more open sites, such as those in plates 57 & 58.

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