JOINT NATURE CONSERVATION COMMITTEE

UK Seabirds in 2008

Results from the UK Seabird Monitoring Programme

Atlantic puffin carrying sandeels. © Bob Perry

Welcome to the fourth edition of UK Seabirds

This leaflet summarises the main findings of the UK's Seabird Monitoring Programme (SMP) in 2008. Since 1986, the SMP has co-ordinated seabird monitoring on a UK-wide basis, using data collected annually from a representative sample of colonies. In addition, three censuses of breeding seabirds have been conducted in Britain and Ireland during 1969-70, 1985-88 and 1998-2002. The programme is led by JNCC in partnership with the statutory country nature conservation agencies and other conservation organisations (see back cover for a full list of partners). The SMP enables its partners to monitor aspects of the health of the marine environment and to provide sound advice on the conservation needs of breeding seabirds. Recent developments in SMP data collation and analytical techniques have enabled us in this issue to present for the first time trends in population size of 19 of the 25 species of seabird breeding in the UK. We also present evidence derived from these data that demonstrates how human activities have affected seabird populations in the UK.

Measuring the state of seabird populations in the UK

Within the Seabird Monitoring Programme two aspects of state are measured:

Breeding abundance - the number of breeding pairs or individuals is a medium to long term measure of state (seabirds are long-lived species with relatively low mortality rates and delayed onset of breeding).

Breeding success - the number of chicks fledged per breeding pair more immediately reflects fluctuations in environmental conditions, such as food supply or weather conditions.

Breeding abundance and success are both expressed as population indices, whereby the number of birds or number chicks fledged per pair in a sample of colonies in a particular year is expressed as a percentage of the value for the same colonies in 1986, when the SMP was initiated.

Why should we care about seabirds?

- **Seabirds are an important component of biodiversity in the UK** - over seven million breeding seabirds, of 25 species, benefit from the nutrient-rich waters of the NE Atlantic and from safe nesting sites along thousands of kilometres of coastline.

- **Seabirds are a useful indicator of the state of our seas** - seabirds are top predators: changes lower down the food chain and in the marine environment are likely to be manifested in their populations.

- **Human activities affect seabirds in the UK** - climate change, introductions of predators and commercial fishing have all had measurable adverse impacts on seabirds in the UK (see page 8). Humans have also benefited seabirds by providing them with food through waste disposal on land and at sea, and by providing safe nesting sites on top of buildings and on other man-made structures.

- **Seabirds provide an important source of income for local economies** - seabirds have a wide appeal to people: spectacular 'seabird cities' and engaging species like the Atlantic puffin draw visitors from near and far.

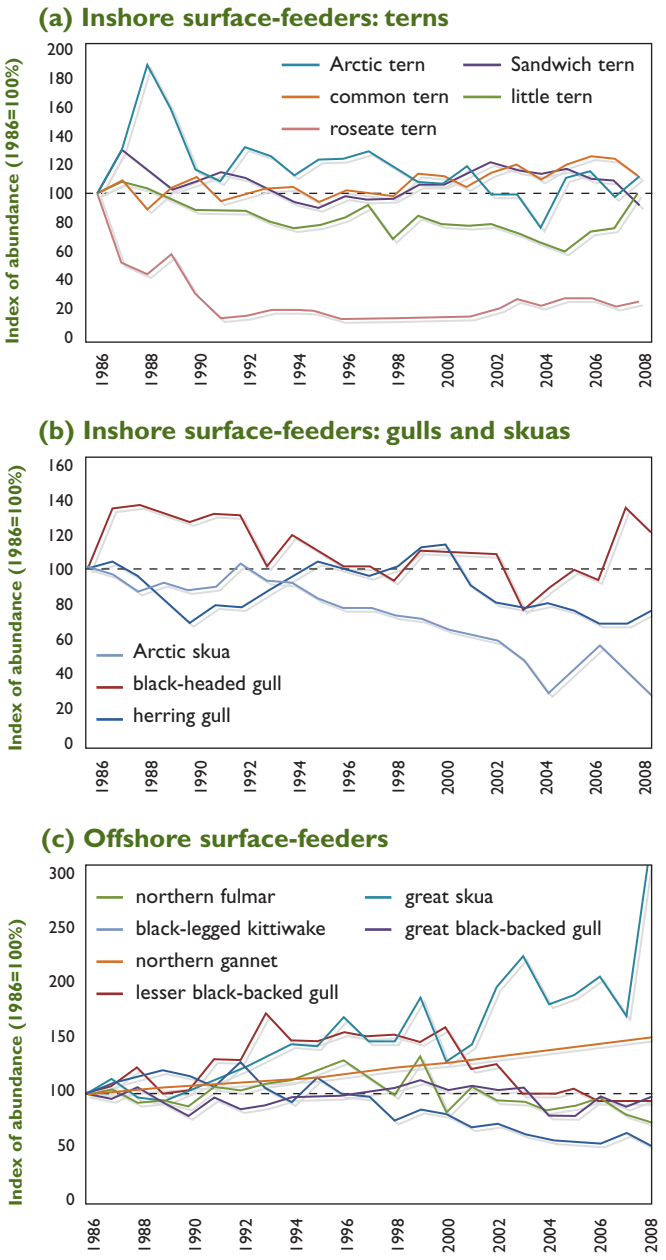
- **The UK is an internationally important breeding area for seabirds** - 13 species breeding in the UK are present in internationally significant numbers.

- **Seabirds are protected by European law** - under the EC Birds Directive, the UK's most important seabird colonies are protected within Special Protection Areas (SPAs). Work is currently underway to identify areas at sea that are important for seabirds (e.g. for foraging) that could be designated under national and international legislation.

In the UK, the number of breeding seabirds increased from around 4.5 million in the late 1960s to 7 million by the end of the 1990s. Since the last census was conducted in 1998-2002, the total number of breeding seabirds has probably decreased: between 2000 and 2008, changes in population size of each of 19 of the 25 species breeding in the UK (Table 1) add up to an overall decrease of around 9%.

Since the first seabird census in the late 1960s, changes in breeding numbers have varied greatly between individual species (see Table 1). Of the seabird species breeding in the UK, only northern gannet and great skua have sustained an upward trend in population size from 1969 to 2008. All other offshore surface-feeders (Figure 1c) have started to decline in numbers at various points since the mid-1990s and consequently, there are now 40% fewer black-legged kittiwake and 16% fewer great black-backed gull compared with the late 1960s (Table 1). The populations of the three offshore diving species increased in size throughout the 1970s, 80s and 1990s

Figure 1: Relative breeding abundance of seabird species in the UK between 1986 (the start of the SMP) and 2008.

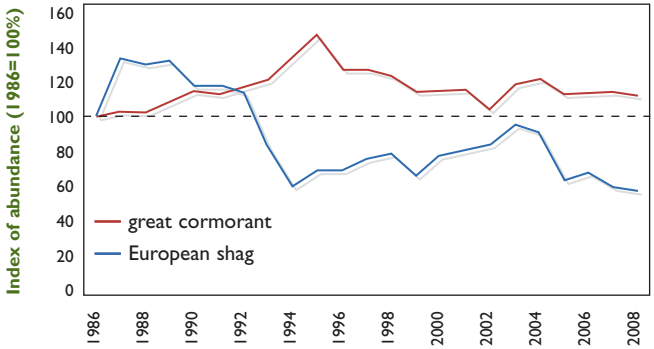


European shag chicks. © Ken Plows

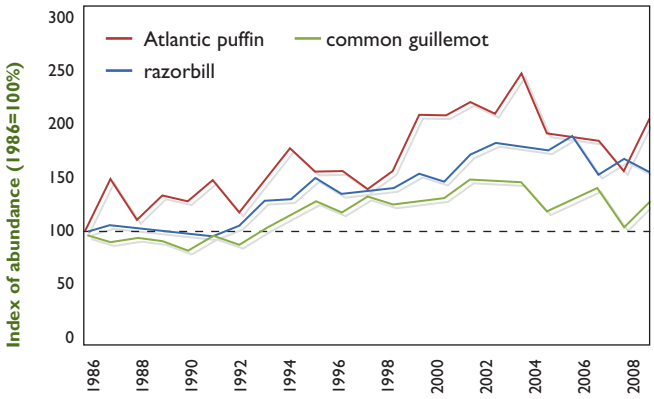
(Table 1) but started to level off in 2000 and are now starting to decline (Figure 1e).

In contrast to the 'offshore species', fewer inshore feeders have shown positive trends since the late 1960s (Table 1). Four inshore species have shown large declines. Herring gull and roseate tern numbers have both declined by more than 50% since 1969/70 (Table 1), but while the latter has started to slowly recover since 2000 (Figure 1a), numbers of herring gulls have continued to decline (Figure 1b). European shag numbers declined sharply following a year of partial non-breeding in 1993 and storms early in 1994. The subsequent recovery of shag numbers was reversed by another 'storm-wreck' in early 2005 (Figure 1d). There are now 33% fewer shags breeding in the UK than in 1969. Arctic skua numbers have declined sharply by two thirds since the early 1990s (Figure 1b). Numbers of Arctic skuas appear to be only 14% lower than during the late 1960s (Table 1), but the census in 1969/70 probably underestimated the size of the UK Arctic skua population.

(d) Inshore divers



(e) Offshore divers



Species	Latest population estimate (1998-2002)	Change in population 1969-2008	Change in population 1986-2008	Change in population 2000-2008
Inshore surface-feeders:				
Arctic skua	2,100	-14%	-66%	-57%
(Mediterranean gull)	115	NA	NA	NA
black-headed gull	77,000	17%	11%	11%
(mew gull)	21,000	NA	NA	NA
herring gull	130,000	-69%	-42%	-33%
Sandwich tern	12,000	-2%	-29%	-13%
roseate tern	#77	-92%	-76%	38%
common tern	10,000	-15%	-16%	-2%
Arctic tern	47,000	-4%	28%	5%
little tern	1,900	51%	-4%	27%
Inshore divers:				
great cormorant	7,500	19%	9%	-3%
European shag	27,000	-33%	-45%	-25%
(black guillemot)	39,000	NA	7%	4%
Offshore surface-feeders:				
northern fulmar	500,000	53%	-14%	-11%
(Manx shearwater)	300,000	NA	NA	NA
(European storm-petrel)	26,000	NA	NA	NA
(Leach's storm-petrel)	48,000	NA	NA	NA
northern gannet	*220,000	66%	30%	18%
great skua	9,600	388%	164%	56%
lesser black-backed gull	87,000	7%	-17%	-41%
great black-backed gull	17,000	-16%	-10%	-6%
black-legged kittiwake	380,000	-40%	-52%	-36%
Offshore divers:				
common guillemot	1,400,000	131%	28%	-2%
razorbill	190,000	50%	27%	5%
Atlantic puffin	580,000	36%	40%	-1%

Table 1: Changes in numbers of seabirds breeding in the UK during 1969-2008; 1986-2008 and 2000-2008. The latest population estimates are in breeding pairs, apart from those of common guillemot, black guillemot and razorbill, where individual adults present at the colony were counted.

Species in parentheses were excluded from trend plots in Figure 1 as there were insufficient data. *Northern gannet figures are from the latest complete census in 2004/5. #Roseate tern estimate from 2008. Population estimates have been rounded.

The percentage changes in population during the three periods were calculated by comparing estimates of population size in 2008 with census figures from 1969-70, 1985-88 and 1998-2002. Estimated population sizes for 2008 were obtained by extrapolating from 1998-2002 census figures using subsequent rates of change measured in the SMP sample of colonies.

Northern gannets. © Bob Perry

Seabirds under pressure

Seabirds in the UK are affected by human activities. Some activities can benefit seabirds: for instance, fishing vessels can be an important source of food for those seabirds that feed on discarded fish and offal. However, the pressure from some activities can have substantial negative impacts on seabirds in the UK. Table 2 identifies these pressures and assesses the nature and magnitude of their impacts. The assessment was based on expert judgement that was supported by published evidence where possible. The impacts of climate change and of the introduction of non-native species were considered to be the highest and increasing (See pages 10-11 and pages 14-15 for details). There is evidence that the presence of commercial fishing for sandeels off eastern Scotland in the 1990s negatively impacted on black-legged kittiwake populations. This pressure was removed by a ban in 2000. Details of this and other impacts of fishing are detailed on pages 12-13. Large numbers of seabirds from UK colonies have been killed by contamination with hazardous substances resulting from oil spills from ships during the last 20 years. However, this mortality does not appear to have had any substantial lasting effect on the size of the UK breeding populations of those species affected (mainly common guillemot and razorbill). Activities associated with the development of offshore renewable energy sources and with leisure and recreation can create visual disturbance to seabirds that effectively leads to the loss of habitat available for foraging, nest building and other essential activities. These impacts are currently localised and considered to be low across the UK as a whole. However, as UK and devolved governments strive to meet their targets for renewable energy production, the level of visual disturbance and habitat loss from the resulting offshore installations is likely to increase. It is unclear if this increased pressure will result in fewer birds using UK waters or whether they will relocate elsewhere around the UK. Marine litter is ingested by northern

Burning of fossil fuels is a major source of green house gas.

fulmars and other surface feeding seabirds.
As a consequence, non degradable plastics accumulate in large quantities in their stomachs. However it is unclear what effect this ingested litter has on the birds' health and long-term survival.

Continued monitoring of species at risk will provide an early warning of negative impacts of all the pressures described above.

Pressure	Activity causing pressure	Impact	Magnitude / trend of impact
Climate change	Multiple	Reduction in abundance and quality of seabird prey (i.e. lesser sandeels)	High/increasing
Contamination by hazardous substances	Oil & gas; shipping operations	Mortality following contamination with spilled hazardous substances	Low/stochastic
Marine litter	Multiple	Plastic waste at sea is ingested by surface feeding seabirds	Low/no change
Visual disturbance & habitat loss	Renewable energy; leisure & recreation	Offshore windfarms and watersports can exclude seabirds from foraging areas	Low/increasing
Introduction of non-native species	Shipping operations; leisure & recreation	Size reduction or extinction of seabird colonies as a result of predation by non-indigenous mammals	High/increasing
Removal of species (target & non-target)	Fishing	Mortality from bycatch (i.e. incidental killing of birds in fishing gear)	Unknown/ unknown
		Reduction in discards and offal discharge lowers food availability for scavenging species	Unknown /increasing
		Reduction in abundance of lesser sandeels available to seabirds in the North Sea	High/ decreased to low

Table 2: Pressures affecting seabirds in the UK (for further explanation see pages 10-11, 12-13 and 14-15.)

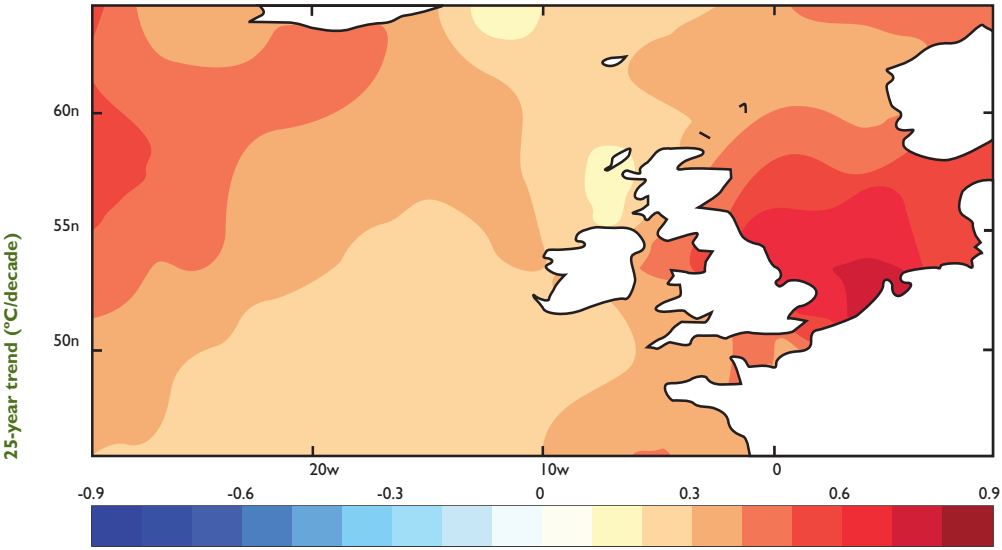


Figure 2: 25-year trend in sea-surface temperature (°C/decade, 1982-2006) for the north east Atlantic. Reproduced with permission from Holliday et al. 2008[1].

Sea-surface temperatures in the north east Atlantic and UK coastal waters have been rising since the 1980s by around 0.2-0.9°C per decade, with the most rapid rises occurring in the southern North Sea and the English Channel[1] (Figure 2). The rising sea temperatures led to a change in the North Sea plankton community in the late 1980s and consequently large reductions in abundance of the zooplankton on which larval fish feed[2]. In addition, poor sandeel productivity is associated with warmer sea-surface temperatures[3]. Analyses of data collected by the SMP have provided evidence strongly suggesting climate driven changes in the food chain have had acute negative impacts on seabirds breeding on Britain's North Sea coast. Low breeding success of kittiwakes and of other species such as common guillemot that rely on sandeels, have occurred with increasing frequency in recent years (Figure 3). Indeed, kittiwakes in eastern Britain have fledged fewer young in recent, warmer years[4,5] (see Figure 4), which is thought to be linked to the relationship between temperature and sandeel productivity (see above). Observations at colonies monitored by the SMP confirmed that seabirds were catching fewer and smaller sandeels than normal during years of poor breeding performance. The calorific content of these sandeels was also much lower in 2004, one of the least successful breeding seasons for seabirds in recent times[6].

Long-term declines in numbers of black-legged kittiwake are expected to continue unless the recent rises in sea-surface temperature are reversed[4]. Reversing the recent warming of the oceans is reliant on the success of global efforts to combat

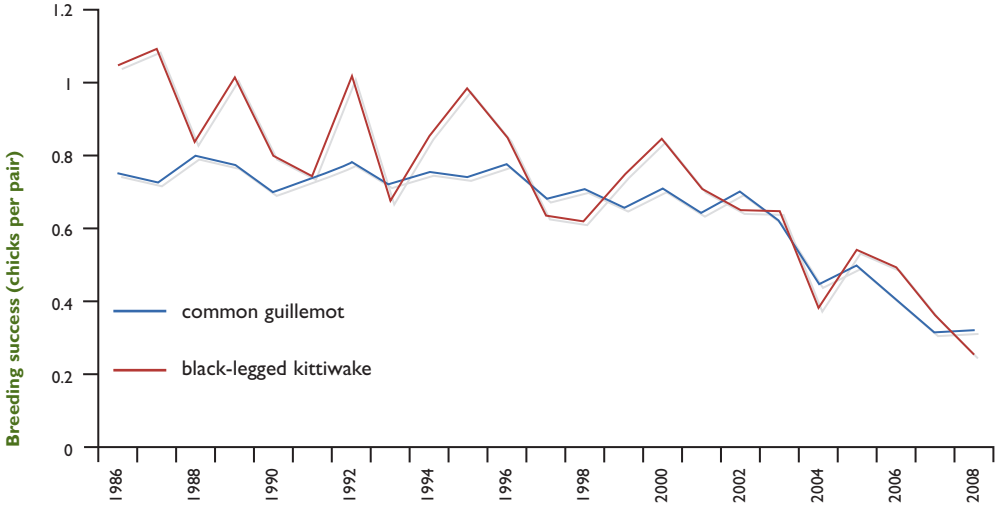


Figure 3: Mean annual breeding success of black-legged kittiwake and common guillemot in the UK, 1986-2008.

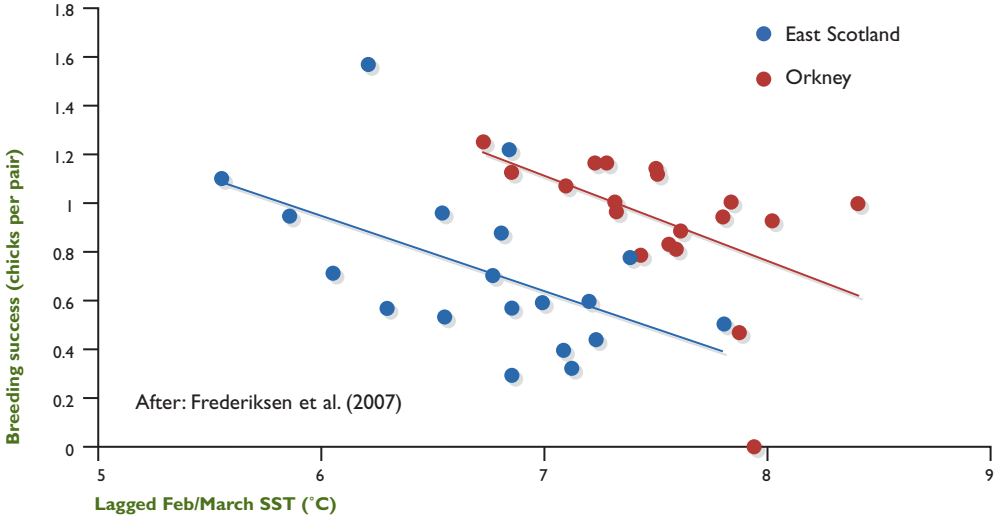


Figure 4: The relationship between mean annual breeding success of black-legged kittiwake and mean winter sea-surface temperature (lagged one year earlier). Reproduced with permission from Frederiksen et al. (2007)[5].

climate change. In the short-term a better understanding of the interactions between climate, plankton and fish may help to mitigate the impacts of climate change by identifying where other pressures can be most effectively reduced or eliminated.

Do fisheries affect seabirds?

For years, some seabirds have benefited from fisheries through food provided at sea by discharging offal and discarding undersize fish. As a result, the abundance of scavenging species (e.g. great skua, northern fulmar) may have been elevated above levels that naturally occurring food sources could sustain. The necessary introduction of measures to conserve fish stocks has consequently reduced the amount of discards, as has the decline of some commercial fisheries, which has also resulted in less offal being discharged. It is conceivable that the reduction in food provided by the fishing industry may have contributed to a population downturn of fulmars and other offshore surface-feeders since the mid-1990s (see Figure 1c).

Another consequence of fewer discards is that great skuas have had to rely increasingly on other food sources, including the predation of other seabirds, which is having a negative impact on their prey populations (e.g. Arctic skuas)[7].

But fisheries can compete with seabirds for the fish they eat. Off southeast Scotland a sandeel fishery that operated in the 1990s significantly depressed adult survival and breeding success of black-legged kittiwakes at adjacent colonies compared with years prior to the fishery opening and after it was closed[8]. Since 2000 there has been a ban on sandeel fishing off eastern Scotland and NE England. If fishing is resumed to levels that significantly reduce local sandeel stock

size, it would probably exacerbate reductions in breeding success and survival caused by increases in sea surface temperature as a result of climate change [4,5,8](see pages 10-11).

Northern fulmars appear to be particularly susceptible to entanglement in offshore fishing nets and regularly take the baited hooks of long-line fisheries. Auks can become trapped in inshore salmon nets. However, data are currently lacking on the numbers of seabirds caught by long-line and other fisheries in UK waters. Such information would contribute to efforts at a European level to address the impact of seabird bycatch.

Costs and benefits of fishing: a northern fulmar caught on a hook set on a commercial long-line (top); fulmars flocking around a commercial long-lining vessel to scavenge discarded fish (bottom) (Terje Lislevand/RSPB)

Island invaders

Introductions of non-native mammals to islands have had major negative impacts on the resident colonies of ground-nesting seabirds. Mammals such as brown rat and American mink predate on seabird eggs, chicks and in some cases, adult birds. Predation by mammals has caused the extinction of some colonies of ground-nesting seabirds such as terns, gulls, storm-petrels, Manx shearwater and Atlantic puffin. Other colonies have been substantially depleted, with seabirds confined to breeding in places that are inaccessible to predators. For example, Figure 5 shows that significantly more Atlantic puffins breed on predator-free islands than on those with mammalian predators.

The pressure from non-native mammals can be eliminated through management: a) Eradication of non-native mammals from islands has resulted in the expansion of existing seabird colonies and in the re-colonisation by seabird species. b) Quarantine measures can prevent the invasions of islands by non-native mammals. Some highly effective interventions have been made but a more strategic national approach would achieve the greatest conservation gains for seabirds for the least cost. Figure 5 demonstrates how SMP data on colony size could be used to prioritise colonies for management.

Common tern chicks from the cache of an American mink on an island in Argyll & Bute (J.C.A. Craik)

American mink. © Bob Perry

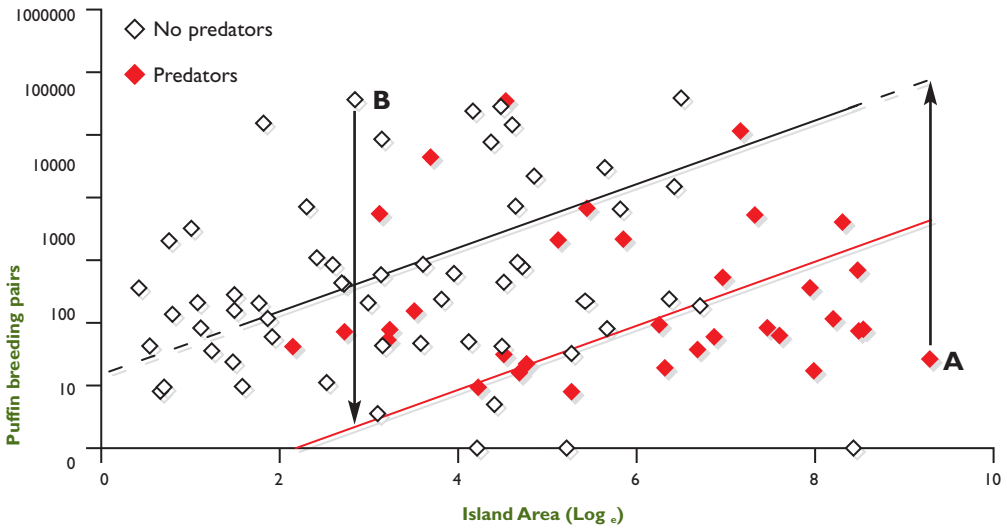


Figure 5: The impact of the presence of mammalian predators on the size of Atlantic puffin colonies on islands in the UK. (Source Mitchell & Ratcliffe 2007)[9]. The vertical distance between the black data points and the red line indicates the potential loss in numbers following invasion; the vertical distance between the red data points and the black line indicate the potential gain in numbers once predators have been eradicated. These data can therefore be used to identify those colonies where a) the removal of predators would result in the greatest gains in seabird numbers (e.g. A); and b) inadequate quarantine measures may lead to predator invasion that would result in the greatest reductions in seabird numbers (e.g. B) .

The new SMP website is now online!
Visit www.jncc.gov.uk/smp to enter and view counts for any seabird colony in Britain and Ireland.

A range of breeding seabird datasets are also now available at www.jncc.gov.uk/page-4460

For more information about the SMP and monitoring seabirds in the UK, go to www.jncc.gov.uk/seabirds or contact: Dr Matthew Parsons, SMP Co-ordinator. Tel: 01224 655715, email: matt.parsons@jncc.gov.uk or write to: JNCC, Dunnet House, 7 Thistle Place, Aberdeen AB10 1UZ

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Front page photograph: Black-legged kittiwake. ©Hugh Harrop / www.hughharrop.com
The Joint Nature Conservation Committee advises the UK Government on national and international wildlife and conservation issues on behalf of Natural England, the Countryside Council for Wales, Scottish Natural Heritage and the Northern Ireland Environment Agency

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