



# Penguins

*Reports suggest that climate change is putting penguins in peril. Scientists at British Antarctic Survey investigating long-term changes in penguin populations report what's happening to these iconic birds.*

## Are penguin populations really declining?

Some species and populations are but others are not – it depends on where you look. Long-term monitoring of penguin populations on subantarctic islands reveals a complex picture. In the last 30 years, populations of Adélie penguins on the South Orkney Islands have fluctuated and are currently in decline, while chinstrap populations have decreased significantly and gentoo numbers have risen. On South Georgia, the population of macaroni penguins has declined from 2.5 million breeding pairs in the 1970s to just about 1 million today. King penguins have increased from a few hundred in the 1920s to over 450,000 today. Further south, emperor penguins, which breed on sea ice surrounding continental Antarctica, have also experienced a decline in numbers during recent decades – by up to 50% in places and one of the most northerly colonies of emperors on a small offshore island close to the Antarctic Peninsula is now thought to have disappeared completely.

## Why is there such a difference between species?

This is a key issue that British Antarctic Survey (BAS) scientists are currently working on. Unravelling the reasons behind the changing populations of penguins in the subantarctic is complex and involves a number of factors. Food supply and available nest sites are likely to be responsible for most of the changes observed in penguin populations. BAS and US scientists have discovered that sea ice plays a major role in declining penguin numbers. Krill, the small shrimp-like crustacean that is the main food source for many species of penguins, seals and whales, spend their early life grazing phytoplankton from the underside of winter sea ice. The observed Adélie and chinstrap population changes are linked to reductions in sea ice and the associated changes in food supply.

## So, is climate change affecting penguin populations?

The rapid climate warming on the western Antarctic Peninsula has reduced sea-ice cover by around 40% in the last 30 years which impacts the success of the 'krill nurseries'. Ice-dependent species, such as the Adélie, are being affected by this change. However, the less ice-dependent species, such as chinstraps, fare better where they can move into areas with less sea ice but with adequate breeding habitat and food supplies. However, chinstraps are also in decline, indicating

that the impacts of climate change are not simple to interpret.

## What about the impact of krill fishing?

So far there is no evidence to suggest that commercial krill fishing is affecting penguin populations, but scientists at BAS are working with international bodies to ensure that krill fisheries are managed in a sustainable way that minimises any potential impact on Antarctica's marine life.

## How much do we know about penguins?

The penguin colonies studied by BAS near its Signy and Bird Island research stations are among the best studied colonies in the world.

The long-term research programme provides a valuable insight into how these engaging animals are responding to changes in their habitat.

Because penguins breed on land or ice, scientists have a good understanding of this part of their life-cycle. But because these seabirds can spend three-quarters of their lives in the ocean – more than any other bird – studying them is challenging. As a result, we are only now beginning to discover what penguins do when they are away from land.

## How do scientists study penguins?

Scientists at BAS have developed innovative satellite and tagging systems to track penguins on land and sea. To monitor a colony of macaroni penguins at Bird Island

Research Station the science team developed and installed a 'penguin gateway'. As tagged birds pass between the colony and the sea, the 'gateway' records the tag number and the time and direction of travel. This allows scientists to deduce how long birds spend foraging at sea and reduces the necessity to handle the birds during the study. A joint project with Japan's National Institute of Polar Research obtained the first observations of penguins underwater thanks to miniature digital cameras attached to the birds' backs. BAS scientists are able to track penguins at sea using tiny GPS and geolocators devices, which weigh only a few grams and are attached to penguin leg rings. All of these techniques help reveal the reasons for success or failure of penguin colonies and help build a better picture of the overall state of the Southern Ocean ecosystem.



▲ Adélie penguins on Adelaide Island, Antarctic Peninsula

## FACTFILE

- There are 17 species of penguin. All live only in the southern hemisphere.
- There are around 20 million breeding pairs of penguins in the Antarctic.
- Although bigger species exist in the fossil record, the world's largest penguin is the emperor; standing around 115cm tall and weighing in at 40kg.
- Because they breed on sea ice around Antarctica, emperor penguins may be the

- only species of bird never to set foot on land.
- Somewhat ungainly on land, penguins are superb divers and swimmers. Unlike other birds, whose bones are light and air-filled, penguins' bones are solid and heavy.
- Penguins' closest relatives are petrels, albatrosses and divers.