

## Exercise 4

### The changing fortunes of Antarctic penguins

*Robert Gates explains how climate change has started to affect the natural habitat of the Adélie penguin*

**A** The effects of climate change are complex, with scientists constantly trying to understand how ecosystems are affected. Nowhere is this more so than in the Antarctic – a place where no humans live permanently, but which nevertheless is undergoing change due to human interference.

**B** Over the last five years, scientists have been examining the populations of different types of penguin that inhabit the Antarctic continent. In particular, they have been looking at penguins living on Ross Island – a huge island connected to the Antarctic mainland by a permanent sheet of ice, and formed from four large volcanoes, one of which is still active. On the western side of Ross Island is Cape Royds, home to a colony of Adélie penguins. In 2000, there were estimated to be about 4,000 Adélie nests, but a survey carried out in the last few months found that the number had fallen to 2,100.

**C** Scientists say there are two main reasons for the population decline in this part of Ross Island. Firstly, Adélies cannot lay their eggs directly onto ice or snow. However, the average winter air temperature of the area has risen in the past half century. This causes more snow to fall, which buries the rocks on which Adélie penguins would typically construct their nests. Secondly, after a female Adélie lays her egg, she walks to the sea in search of food, while the male remains behind to hatch the egg. As soon as the female reaches an area of open sea, she will dive into the water and start feeding. When the female returns with fish for the penguin chick to eat, the hungry male also hurries off to reach the sea. In previous centuries, the walk would have been relatively short, between 15 and 20 kilometres. But in 2000, a large iceberg blocked the mouth of McMurdo Sound, where many Adélie penguins went to find food. At the same time, the ice in the bay at Cape Royds failed to break up as it had done in the past. This meant the Adélies then had to walk much further over the ice – often up to 75 kilometres – before they could reach the ocean. The result was often that the parent waiting on the nest became too hungry to wait any longer, and the eggs were abandoned.

**D** Elsewhere on Ross Island, in contrast to McMurdo Sound, the situation is more encouraging. At Cape Crozier, Adélie penguins are thriving. The colony is now thought to have an estimated 230,000 breeding pairs, an upturn of 20% over the last three decades. Penguins nesting on this part of Ross Island may actually be benefitting from human activity, scientists suspect. In 1996, a fishing company opened near the area, and started fishing for vast quantities of Chilean sea bass – otherwise known as the Patagonian toothfish. As both the Adélies and the sea bass eat silverfish, competition for this food source has now been dramatically reduced, and this may partly explain why penguin numbers have risen at Cape Crozier.

**E** However, it isn't fish, but krill – tiny, shrimp-like creatures that live just below the pieces of ice that float on the sea – that form the largest part of an Adélie's diet. Unfortunately, krill numbers are also declining rapidly. Dr So Kawaguchi, a biologist working for the Australian government's Antarctic Division, suspects he knows the main reason behind this. He accepts that commercial fishing is partly responsible for huge amounts of krill being removed from the sea, but he points to rising levels of carbon dioxide as the chief cause. It is this which is making the waters of the Antarctic more acidic, in turn preventing the krill eggs from hatching. Diminishing levels of krill not only means less food for penguins. Digesting up to 40 million of these tiny animals per day, most whales depend on them for survival, too. Also, thanks to their more diverse diet, Gentoo penguins, a species which eats squid and small crab-like creatures as well as krill, have hardly been affected by this situation. In fact, their numbers appear to be on the rise. Other species, such as the Chinstrap and Emperor penguins, however, have the same narrow diet as Adélies.

**F** Scientists are now concerned that Adélie penguins will be forced to move further south in search of more suitable breeding and feeding locations. A team made up of researchers from Stanford University, USA, and the British Antarctic Survey have recently used geolocation sensors attached to a number of penguins to track them in order to better understand their patterns of migration. They know that Adélie penguins leave their nesting areas in February to begin the slow march north to avoid the darkest time of the year. Around 480 kilometres from completely open water, they stop on the floating sea ice to spend time feeding and increase their body weight. They then turn around, and march back to the nesting areas – a journey of about 13,000 kilometres in total. Scientists also know that Adélies have never lived further south of Cape Royd, and suspect that this is because they need light in order to navigate and search for food. It also allows them to spot such predators as the skua – a large bird that can easily kill young penguins. So, will the Adélies be able to adapt, move further south, and live in a darker environment? Scientists doubt that this kind of evolutionary change can happen in a short time.

*Read the information. Spend two to three minutes getting a general idea of each paragraph in the passage. Then choose the correct answers.*

1. In paragraph A/B/C/D/E/F , you can find information about where Adélie penguins lay their eggs.
2. Paragraph A/B/C/D/E/F gives information about why there is less food for Adélie penguins to eat.
3. In paragraph A/B/C/D/E/F , you can find information about how many penguin nests are on Ross Island.
4. You can find some opinions about what Adélie penguins might need to do to survive in the future in paragraph A/B/C/D/E/F .
5. Paragraph A/B/C/D/E/F explains why one population of Adélie penguins has increased.

The introduction to the Reading passage is in paragraph A/B/C/D/E/F