



## SPQ Module 14 - Penguins in Peril



Penguins are flightless birds. Many birds use flight to escape from predators, but penguins appear to have lost the ability to fly due to the fact that they had no natural land dwelling predators. That all changed with the arrival of man.

Penguins are not unique to Antarctica, some species being native to Southern Africa, South America, and Australia, and even as far north as the Galapagos Islands. A commercial penguin oil industry thrived for a few decades in the mid 19<sup>th</sup> century but declining populations in easily accessible locations slowed this trade. Penguin eggs were also harvested as a source of food.

Early explorers to Antarctic took ready advantage of the penguin's abundance and harvested them to use as a source of oil for cooking fuel as well as for meat. Ernest Shackleton and his men, stranded on Elephant Island after the loss of their ship to sea ice in 1915, lived on a diet rich in penguin until finally rescued many months later.



Figure 1: Charles Green, the cook on Shackleton's Endurance expedition (1914 - 16) preparing a penguin (photo: Frank Hurley).

One of the set goals of the Scott expedition of 1910 - 1913 was to harvest Emperor penguin eggs at different stages of development in order to establish the embryology of what they thought at the time was "the most primitive bird in existence". The journey to collect these eggs in the middle of winter ultimately proved a success but the weather was so severe it almost killed the men involved.

In more recent times penguins have been used as a source of food for dog teams on expeditions and based at scientific research stations. However since 1990 all dog teams were removed from the Antarctic continent. In 1991 the Antarctic Environmental Protocol was signed

which made the entire Antarctic continent a natural reserve, thereby enshrining the preservation of Antarctic wildlife, including penguins.

With an international treaty now protecting them, one would imagine that life would be looking up for the Antarctic penguin. Unfortunately this does not appear to be the case. Although man is no longer directly killing penguin for commercial or scientific purposes, mankind now appears to be harming them in a far more insidious manner.

To understand what is threatening Antarctic penguins one must first recognize the ecosystem in which they live. An ecosystem by definition is composed of all the living and climatic factors that make up a natural environment. Some of the elements of the Antarctic penguins ecosystem are the temperature of the water and air around them, the creatures in the sea that they feed upon, and feed upon them, and the hours of sunlight they enjoy. Any perturbation of one element in an ecosystem has the potential of unbalancing any other feature of the ecosystem. This is why it is said that ecosystems are fragile.

A relatively small change in the mean annual temperature of the ocean and air surrounding the Antarctic Peninsula is a fine example of how easily an ecosystem can be disrupted. In the winter, algae stick to the bottom of pack ice. As the ice melts this algae is then eaten by krill, little shrimp-like creatures that are one of the staples of the penguin diet. The warming of the ocean and air around the Antarctic Peninsula has caused less pack ice formation. Less pack ice results in a decrease in the availability of algae and consequently fewer krill. The end product of the slight change in ocean and air temperature is that penguins have less to eat, and begin to die.

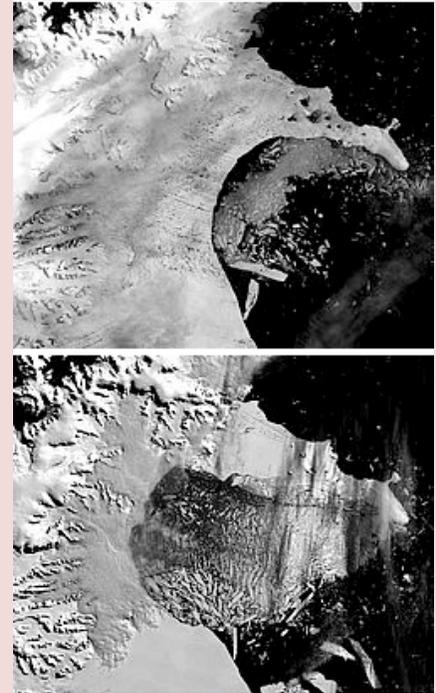


Figure 2: Collapse of a portion of the Larsen B ice shelf in the Antarctic Peninsula in 2003. The loss of ice shelves signals the destruction of penguin habitat (Source: NASA).

#### Did You Know?

In addition to climate change penguin wellbeing is also under threat from:

- Overfishing
- Oil spills and pollution in the oceans
- Introduction of foreign animal species to their environment
- Ultraviolet light which harms krill

Another byproduct of global warming that is harming penguins is more frequent rain on the Antarctic Peninsula. Rains in the summer months (December - January) can soak young baby penguins that have not yet grown their water repellent feathers. At night when the temperature falls below zero the little penguins freeze to death.

Studies of the Adelie penguins of the Antarctic Peninsula demonstrate a decline in population of almost 50% over a ten-year period. Scientists believe that this drop is a byproduct of climate change, and that if global warming accelerates as is predicted, the decline in Adelie penguin population on

the Antarctic Peninsula will accelerate.

It would be simplistic to assert that all changes to an ecosystem, such as those wrought by climate change are harmful to all creatures. Sometimes ecological changes can influence the balance of systems to the benefit of an organism. In East Antarctica some penguin populations have been growing larger. This is thought to be a product of slighter warmer waters and earlier pack ice break up leading to easier access to feeding grounds, better nutrition and more successful penguin breeding. However these 'benefits' usually come at the expense of another organism.

The speed of ecological change has a great influence on whether an animal will be adversely affected by an environmental disruption. Plants and animals have the capacity to adapt to change in their environment that will allow them to continue to prosper. However adaptation takes time. The climate on earth has changed continuously over history, but these changes have more often than not been gradual. If the temperatures in the Antarctic Peninsula rose gradually over hundreds of thousands of years penguin populations would doubtless have time to adjust. The problem with the current warming trend on earth is that it is happening very rapidly, not allowing plants, and animals such as the penguin time to adapt.

Ray, Richard and Kevin will likely not see any penguins on their journey, as they start their expedition deep on the Ronne Ice Shelf far from the coastal habitat of the penguin. It seems a shame to go all the way to Antarctica and not see a penguin. A suggestion was made that they all dress like penguins and call their expedition 'the march of the penguins'. Penguin suits were ordered, but unfortunately they did not arrive in time.



Antarctic Krill (Photo: Uwe Kils)

#### Did You Know?

Since the leopard seal relies on the Adelie penguins for a stable food sources, it is believed the decline in Adelie numbers will result in the same fate for the seal population.